BTEC

# BTEC Level 3 in Dental Technology (QCF)

## Diploma
## Extended Diploma

# Specification

**First teaching September 2014**
**Issue 3**

Pearson

Pearson BTEC Level 3 Diploma

Pearson BTEC Level 3 Extended Diploma

in

# Dental Technology (QCF)

## Specification

First teaching September 2014

Issue 3

### Edexcel, BTEC and LCCI qualifications

Edexcel, BTEC and LCCI qualifications are awarded by Pearson, the UK's largest awarding body offering academic and vocational qualifications that are globally recognised and benchmarked. For further information, please visit our qualifications website at qualifications.pearson.com. Alternatively, you can get in touch with us using the details on our contact us page at qualifications.pearson.com/contactus

### About Pearson

Pearson is the world's leading learning company, with 35,000 employees in more than 70 countries working to help people of all ages to make measurable progress in their lives through learning. We put the learner at the centre of everything we do, because wherever learning flourishes, so do people. Find out more about how we can help you and your learners at qualifications.pearson.com

This specification is Issue 3. We will inform centres of any changes to this issue. The latest issue can be found on our website.



ISBN 978 1 446 93706 8

# Summary of specification changes for the qualifications covered by this specification

The latest issues of the BTEC Level 3 QCF specifications have had minor updates, including formatting and organisation of content. Units and structures of qualifications are unaffected. The updates do not change delivery or assessment of any of the qualifications and centres can continue to use existing assignment briefs.

| Summary of changes made between previous version and this version | Page number |
|---|---|
| An updated explanation of QCF titles and certification is now included in the section *Introduction to the Pearson BTEC Level 3 qualification titles covered by this specification*. | 1-2 |
| Details on Total Qualification Time (TQT) and Guided Learning Hours (GLH) can now be found in *Introduction to the Pearson BTEC Level 3 qualification titles covered by this specification*. | 2 |
| The outline of the purpose of the qualifications in *What are BTEC Level 3 qualifications?* has been updated to reflect updated sector trends, progression opportunities and, where applicable, links to apprenticeship frameworks given in the new section *Purpose of these BTEC qualifications*. The General Dental Council Learning Outcomes for Dental Technicians has been updated to 2015. | 3-4 |
| For increased clarity and ease of use, the information in *Rules of combination for Pearson BTEC Level 3 qualifications in this specification* is now included in the section *Structure of the Pearson BTEC Level 3 qualifications in this specification*. | 6-8 |
| The number of GLH per unit has been included in the section *Structure of the Pearson BTEC Level 3 qualifications in this specification*, to indicate the number of learning hours required to support the indicative content of the unit. | 6-8 |
| The *Further information* and *Useful publications* sections have been removed; the information given in these sections now appears in the relevant sub-sections *Quality assurance of centres* and *Training and support from Pearson*. | 12 and 285 |
| The section *Quality assurance of centres* has been updated to reflect title changes for some Pearson quality assurance documents. | 12 |
| A section on *Meeting local needs* has been added; this section gives information on the use of units from other BTEC (QCF) qualifications. | 14 |
| *Restrictions on learner entry* has been updated to reflect changes in government legislation. | 16 |
| *Access arrangements for learners with disabilities and specific needs* has been renamed *Access to qualifications and assessments* and has been updated to reflect changes in government legislation. | 17 |
| *Professional development and training* has been replaced with *Training and support from Pearson,* it gives updated information on the guidance, support and training available for delivery of BTEC Level 3 qualifications. | 285 |
| *The Pearson BTEC qualification framework* section has been removed. | - |

| Summary of changes made between previous version and this version | Page number |
|---|---|
| The indicative reading for learners in each unit has been transferred to a separate document on the qualification page on the website qualifications.pearson.com to maintain its currency. | 38-281 |
| Minor changes have been made to all units to clarify the content and mapping to the General Dental Council criteria and update terms and technologies. Changes to content are reflected in the unit Delivery guidance, Outline learning plan, Assessment guidance and Programme of suggested assignments where necessary. Changes include: | 23-279 |
| • All units – references to Medical Devices Directive have been replaced with Medical Devices Regulation (MDR) throughout. | 23-279 |
| • Unit 1 – Further clarity of patient interests within process for Learning Outcome 1 (LO1), suggestions for record blocks (LO1), inclusion of digital techniques in dental models (LO2), protecting patient information in stages of construction (LO3), injection moulding in processing dentures (LO3), further materials in single-unit prosthodontics (LO4), vacuum forming retainers in orthodontic appliances (LO5). | 23-38 |
| • Unit 2 – Further clarity of patient interests and professional conduct for effective working relationships (LO1), further detail of medical emergencies and recognising risks (LO2), reference to personal accountability and governing body requirements in responsibilities (LO3), reference to legal and statutory requirements for records (LO4). | 45-51 |
| • Unit 3 – Further clarity of impact of changes in dentition on the patient (LO4) and the need to cover normal and abnormal development in diseases and disorders (LO4). | 64-71 |
| • Unit 4 – Further clarity on storage and handling of waxes (LO2), reference to the management of equipment maintenance and records to minimize risk (LO3) and reference to milling and models in the use of polymeric materials (LO4). | 80-88 |
| • Unit 5 – Further clarity on the scope of practice and team working in the interest of patients (LO1), revision of legislation and detail on referral networks (LO2), details on patient care and ethics (LO3), details on professional behaviour and communication (LO4). | 97-104 |
| • Unit 6 – Further clarity on the need to look at regional differences for dental teams and use of feedback in communication skills (LO1), inclusion of equality and diversity, patient choice and psychological and physiological factors that contribute to oral health (LO2) and reference to clinical guidelines and accountability in preventative dentistry (LO4). | 114 |
| • Unit 7 – Further clarity on the role of communication in oral health promotion, infection control, protection of records, recognising own capabilities and professional and ethical standards (LO1), patient interests, legislation, shade matching and injection moulding (LO2) and assessing fitness for purpose (LO3). | 127-131 |
| • Unit 8 – Further clarity on treatment planning (LO1), references to legislation and new technologies affecting design methodology (LO2), further details on quality assurance and standards (LO3 and LO4). | 140-146 |
| • Unit 9 – Further clarity on current legislation and confidentiality (LO12), detail on handling of complaints (LO3), legislation and personal responsibility (LO4) and revision of legislation (LO5). | 157-167 |

| Summary of changes made between previous version and this version | Page number |
|---|---|
| • Unit 10 – Further clarity on treatment planning, materials for substructure designs and non-metallic restorations (LO1), revision of retainer detail (LO2), revision of all-ceramic crown systems (LO3), revision of examples of material for temporary restorations (LO4) and revision of diagnostic wax up (LO5). | 175 |
| • Unit 11 – Further clarity on regulatory requirements (LO1) and additional information on materials in prosthodontic devices (LO2). | 190 |
| • Unit 12 – Further clarity on manufacturing process to cover prescription review, protecting patients, checking fitness for purpose and communication (LO1), revision of construction methods (LO2), revision of ceramics processes in aesthetic superstructures (LO4) and addition of milling techniques to construction methods (LO5). | 208 |
| • Unit 13 – Further clarity on the need to recognize abnormalities, interpreting risk based on evidence and considering complexity of treatment in orthodontic rationales (LO1). | 225-229 |
| • Unit 14 – Further clarity on active appliance design (LO1), detail on management and use of tools and the relevance of prescriptions to functional orthodontic appliances and orthodontic retaining appliances (LO2), relevance of prescriptions, use of welding and improvement through feedback (LO4) and the need for meeting patient needs, infection control and communication in repair and modifying orthodontic appliances (LO5). | 241-248 |
| • Unit 15 – Further clarity on dental implants relating to material selection for disease prevention and substructures and the use of metals, references to techniques and technology in design, planning and selection and design of abutment in technical procedures (LO1), details of evaluating options and resource management in clinical considerations, requirements for designs to be biomechanically sound, the use of CAD/CAM scanning and milling, checking of fitness for purpose and professional responsibility (LO2) and update of principles and applications of digital systems to current practices (LO3). | 258-264 |
| • Unit 16 – Further clarity of the need to apply standards in the introduction, details on how the topic should be suitable for personal development, personal responsibility, communication and professional networks (LO1), inclusion of log entries on personal conduct and use of evidence (LO2), details on work-based practice such as time management, when to refer, working with managers, handling of complaints, legislation and professional practice in relation to health and safety (LO3) and further detail on the preparation of formal reports (LO4). | 271-279 |

# Contents


Introduction to the Pearson BTEC Level 3 qualification titles 1
Qualification titles 1
Recognition for progression in work-based routes 1
UCAS points and progression to higher education 2
Total Qualification Time 2
Purpose of the BTEC qualifications in Dental Technology (QCF) 3
Rationale for these BTEC qualifications in Dental Technology 3
Level 3 qualifications available in Dental Technology (QCF) 3
National Occupational Standards 4
DTA/DLA statement in support of your personal development 5
Structure of the Pearson BTEC Level 3 qualifications in this specification 6
Pearson BTEC Level 3 Diploma in Dental Technology (QCF) (299 GLH) 7
Pearson BTEC Level 3 Extended Diploma in Dental Technology (QCF) (1006 GLH) 8
Assessment and grading 9
Grading domains 9
Guidance 9
Calculation of the qualification grade 10
Quality assurance of centres 12
Approval 12
Programme design and delivery 13
Mode of delivery 13
Resources 14
Delivery approach 14
Meeting local needs 14
Functional Skills 15
Personal, learning and thinking skills 15

**Access and recruitment** 16

Restrictions on learner entry 16

Access to qualifications and assessments 17

Recognition of Prior Learning 17

**Unit format** 18

Unit title 18

Level 18

Credit value 18

Guided Learning Hours 18

Aim and purpose 18

Unit introduction 18

Learning outcomes 19

Unit content 19

Assessment and grading grid 19

Essential guidance for tutors 20

**Units** 21

Unit 1: Dental Technology Fundamentals 23

Unit 2: Medical Emergencies, First Aid and Communication in the Dental Team 43

Unit 3: Dental Anatomy, Physiology and Disease 61

Unit 4: Basic Dental Materials Science 79

Unit 5: Legislation, Professionalism and Ethics in Dentistry 95

Unit 6: Dental Public Health and Preventative Dentistry 113

Unit 7: Removable Complete Prosthodontics 125

Unit 8: Removable Partial Prosthodontics 139

Unit 9: Dental Laboratory Compliance 155

Unit 10: Design of Fixed Prosthodontics 173

Unit 11: Complex Dental Materials Science 189

Unit 12: Techniques for Manufacturing Fixed Prosthodontics 207

Unit 13: Orthodontic Therapy Principles 223

Unit 14: Design, Manufacture and Modification of Orthodontic Appliances 239

Unit 15: Advanced Dental Technology Techniques and Procedures 257

Unit 16: Work-based Learning in Dental Technology 271

Training and support from Pearson 285

Annexe A 286

Grading domains: BTEC Level 3 generic grading domains 286

Annexe B 290

Personal, learning and thinking skills 290

Annexe C 296

Wider curriculum mapping 296

Annexe D 298

Unit mapping overview 298

Unit mapping in depth 300

Annexe E 302

Mapping to General Dental Council (GDC) 2012 Learning Outcomes for Dental Technicians 302

Annexe F 321

Mapping to Level 3 Apprenticeship in Dental Laboratory Assistant competencies 321

Annexe G 323

Examples of calculating qualification grade above pass grade 323

Points available for unit credits achieved at different levels and unit grades 323

# Introduction to the Pearson BTEC Level 3 qualification titles

## Qualification titles

The qualification titles covered by this specification are:

**Pearson BTEC Level 3 Diploma in Dental Technology (QCF)**

**Pearson BTEC Level 3 Extended Diploma in Dental Technology (QCF)**

The Qualification Numbers (QNs) for the qualifications in this publication are:

| | |
|---|---|
| Pearson BTEC Level 3 Diploma in Dental Technology (QCF) | 601/3492/6 |
| Pearson BTEC Level 3 Extended Diploma in Dental Technology (QCF) | 601/3493/8 |

The appropriate qualification title will appear on learners' certificates. Learners need to be made aware of this when they are recruited by the centre and registered with Pearson.

The qualifications covered by this specification are BTEC Level 3 qualifications that were developed under the Qualification and Credit Framework (QCF). First teaching for most of the qualifications and associated units was from September 2010. The qualifications are now regulated by Ofqual under the Regulated Qualifications Framework (RQF).

The qualification titles were developed under the QCF rules. In order to enable centres, learners and end users to differentiate these titles from earlier and later BTEC Level 3 qualifications, we are retaining the use of the term (QCF) in the qualification titles and this term will continue to be shown on learners' certificates.

The qualifications were developed using a basis of credits, with the concept that units might be shared by or jointly developed with other organisations. At the introduction of the RQF, ownership of all unit content has transferred to the awarding organisation. For consistency with the original qualifications, we have retained the use of the term 'credit' in relation to the sizing of units, however in line with RQF requirements, information has been added regarding the Guided Learning Hours and total qualification time. (See page 2.)

## Recognition for progression in work-based routes

Since they were first introduced, the qualifications in this specification have been used for progression to employment and further work-related training. During the period leading up to the full introduction of reformed occupational routes, these BTEC Level 3 qualifications continue to provide progression to training, Apprenticeship and higher vocational study. Centres should ensure that the way in which qualifications are delivered remains relevant to learners' career aspirations, taking account of local employment needs.

## UCAS points and progression to higher education

BTEC Level 3 qualifications attract UCAS points and are recognised by higher education providers as contributing to admission requirements for many courses. Please go to the UCAS website for full details of points allocated. When selecting their programme of study, learners should check the degree entry requirements with the relevant provider.

## Total Qualification Time

For all regulated qualifications, Pearson specifies a total number of hours that it is expected the average learner can be expected to undertake in order to complete and show achievement for the qualification: this is the Total Qualification Time (TQT).

Within the TQT, there are Guided Learning Hours (GLH), which a centre delivering the qualification is likely to need to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, such as lessons, tutorials, online instruction, supervised study, giving feedback on performance.

As well as guided learning, there is other required learning directed by tutors or assessors. This includes private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

These qualifications also have a credit value which is equal to one tenth of TQT. Pearson consults with users of these qualifications in assigning TQT and credit values.

The TQT and GLH values for the qualifications in this specification are:

- Diploma – 600 TQT – (299 GLH)
- Extended Diploma – 1800 TQT – (1006 GLH).

# Purpose of the BTEC qualifications in Dental Technology (QCF)

## Rationale for these BTEC qualifications in Dental Technology

The UK's dental care market is worth £7 billion, employing a total of 109,110 people, including 67,669 dental care practitioners. Evidence suggests that an increasing proportion of dental care could be delivered by professionals, such as dental therapists and dental technicians, rather than just by dentists.

BTEC Level 3 qualifications in dental technology give learners the opportunity to make progress in the dental technology or medical devices specialisms, whether their chosen route is employment, an apprenticeship or university. The qualifications are offer a progression route for learners who want a career in the dental industry and want to be a registered dental care professional. These qualifications have been developed in line with the published General Dental Council (GDC) Learning Outcomes for Dental Technicians (2015) and the Skills for Health National Occupational Standards for Dental Technicians.

The BTEC Level 3 Diploma and Extended Diploma offer learners the opportunity to develop the skills required to enable them to make an effective contribution to the dental technology sector. The qualifications enable the development of basic competency in core laboratory skills and knowledge in dental and material science, communication, legislation and ethics in dentistry.

## Level 3 qualifications available in Dental Technology (QCF)

### Pearson BTEC Level 3 Diploma in Dental Technology – 60 credits

The 60-credit Pearson BTEC Level 3 Diploma in Dental Technology is a general introduction to the dental technology sector and covers the underlying principles of the industry. It is broadly equivalent in size to one A Level. It is also suitable for mature learners who wish to follow a vocational programme of study as part of their continued professional development or who want employment in the applied science sector. When taken alongside other qualifications, the BTEC Level 3 Diploma in Dental Technology enables learners to progress to higher education or to professional development programmes in the dental or laboratory science industry.

### Pearson BTEC Level 3 Extended Diploma in Dental Technology – 180 credits

The 180-credit Pearson BTEC Level 3 Extended Diploma in Dental Technology offers a more specialised focus. It extends and deepens the specialist work-related focus required when preparing learners for employment as a dental technician or for further vocational study, such as a Foundation Degree in Dental Technology in order to progress to employment, for example as a clinical dental technician. The qualification is equivalent in size to three A Levels.

### Registration with the General Dental Council

It is recommended that the dental laboratory assistant opportunities made available to learners allow them to assist, under supervision, in the manufacture of dental devices. This complements the role of dental technicians who design, manufacture, modify and repair custom-made dental devices.

The BTEC Level 3 Extended Diploma in Dental Technology meets the requirements for the on-programme qualification for the dental laboratory assistant apprenticeship pathway and offers progression to the sector as a dental technician or clinical dental technician and entry to higher qualifications that develop individuals for professional registration with the General Dental Council (GDC).

A learner who is seeking employment in the dental technology sector as a dental technician is required to register with the GDC. The Pearson BTEC Level 3 Extended Diploma in Dental Technology is recognised as an accepted qualification for entry to the GDC's register for dental care professionals (DCP). For more information on the registration of dental technicians, please see the General Dental Council's website: www.gdc-uk.org

Learners could progress to a range of job roles in the dental technology sector, for example:

- Dental Technicians, who design, manufacture, modify and repair custom-made dental appliances
- Prosthodontic Technicians, who design and make dentures
- Conservation Technicians, who undertake crown and bridge work
- Orthodontic Technicians, who make braces to correct tooth positions
- Maxillofacial Technicians based in hospital oral surgery, ophthalmic, cancer and burns units, helping to reconstruct the faces of patients damaged by accident or disease
- Clinical Dental Technicians, who provide a complete set of dentures direct to patients and who also provide other dental devices, such as partial dentures, made to the prescription of a dentist.

## National Occupational Standards

These BTEC qualifications are designed to provide much of the underpinning knowledge and understanding for the National Occupational Standards (NOS), as well as developing practical skills in preparation for work and possible achievement of NVQs. NOS form the basis of National Vocational Qualifications (NVQs). The qualifications in this specification do not purport to deliver occupational competence in the sector, which should be demonstrated in a work context.

Units in this specification relate to the 2015 General Dental Council (GDC) Learning Outcomes for Dental Technicians. These are set out in the GDC's 2015 document on requirements for the dental education and training of dentists and all groups of dental care professionals. Each unit in the specification identifies links to elements of GDC learning outcomes.

The relevant links between units in this qualification and the learning outcomes stipulated by the GDC are outlined in *Annexe E*.

# DTA/DLA statement in support of your personal development

*The Dental Technologists Association (DTA) is a not for profit association representing the interests of dental technicians in the UK. The Dental Laboratories Association Ltd (DLA) is a professional body for dental laboratory owners in the UK. Jointly they have produced this statement regarding the importance of commitment and the application the knowledge and skills gained in the Pearson BTEC Level 3 Dental technology qualifications to any aspiring dental technologist/technician.*

As a learner (trainee dental technologist/technician) starting out in the dental technology sector, you need to consider how you will achieve the required Professional Knowledge and Understanding and enhance your development of the required basic Professional Skills and Abilities.

Often learners believe that achieving high grades in the academic component will be sufficient to progress their careers. This is not the case; dental technology is about applying the underpinning knowledge and understanding, and developing your own practical abilities. Therefore you need to commit a large amount of additional personal time to developing skills such as manual dexterity, so that you can carry out basic tasks repeatedly and quickly.

This type of personal development ensures that basic items are constructed on time and economically. Too often newly qualified technologists/technicians have not spent enough time developing their skills during initial training and find it difficult to integrate into the fast-paced world of work.

The dental technologist constructs custom-made dental appliances and it is essential to develop your eye and hand coordination. As a learner you can make best use of your practical skill development by looking for every opportunity to copy techniques of a master craftsman, developing the skills associated with the various parts of the manufacturing process. Hands-on training, repeatedly carrying out small activities, will develop your speed and accuracy.

A commitment to build your skills and abilities daily, from the very start of your course, is crucial as it cannot be achieved overnight. Dental technology is about learning to master techniques by repeating the process so that you no longer have to think about a task – it is automatic the moment you pick up an instrument.

A commitment to this type of personal development will achieve results the moment you are given a test piece by a potential employer. Most laboratory test pieces contain many natural and technical difficulties. An experienced dental technician/technologist will be able to tell if you have real ability to cope with actual cases by your immediate practical actions.

Both the DLA and DTA realise that new entrants will not be highly skilled in all areas, but those learners who have spent extra time and effort developing their basic abilities will find it easier to adapt to the real working environment. We would, therefore, encourage all trainees from the very start of their training to use every opportunity to develop hands-on skills.

Once you gain a professional position, continuing your personal development will help you to secure your career throughout your whole working life.

We wish you well in starting on the path for your career as a dental technologist/technician.
Don't forget to keep abreast of changes in oral healthcare, and to maintain your knowledge and understanding as this all helps ensure a secure future.

**DTA/DLA October 2013**

# Structure of the Pearson BTEC Level 3 qualifications in this specification

This specification sets out the qualification structure for the following qualifications:

- Pearson BTEC Level 3 Diploma in Dental Technology (QCF)
- Pearson BTEC Level 3 Extended Diploma in Dental Technology (QCF).

## Pearson BTEC Level 3 Diploma in Dental Technology (QCF) (299 GLH)

**Total qualification: 60 credits**

**Mandatory units: 60 credits**

Learners must achieve all five mandatory units comprising 60 unit credits.

| Pearson BTEC Level 3 **Diploma** in Dental Technology (QCF) | | | | |
|---|---|---|---|---|
| **Unit** | **Mandatory units – all 5 units must be taken:** | **GLH** | **Credit** | **Level** |
| 1 | Dental Technology Fundamentals | **60** | **15** | **3** |
| 2 | Medical Emergencies, First Aid and Communication in the Dental Team | **54** | **10** | **3** |
| 3 | Dental Anatomy, Physiology and Disease | **54** | **15** | **3** |
| 4 | Basic Dental Materials Science | **77** | **10** | **3** |
| 5 | Legislation, Professionalism and Ethics in Dentistry | **54** | **10** | **3** |

## Pearson BTEC Level 3 Extended Diploma in Dental Technology (QCF) (1006 GLH)

**Total qualification: 180 credits**

**Mandatory units: 180 credits**

Learners must achieve all 16 mandatory units comprising 180 unit credits.

| Pearson BTEC Level 3 Extended Diploma in Dental Technology (QCF) | | | | |
|---|---|---|---|---|
| **Unit** | **Mandatory units – all 16 units must be taken:** | **GLH** | **Credit** | **Level** |
| 1 | Dental Technology Fundamentals | **60** | **15** | **3** |
| 2 | Medical Emergencies, First Aid and Communication in the Dental Team | **54** | **10** | **3** |
| 3 | Dental Anatomy, Physiology and Disease | **54** | **15** | **3** |
| 4 | Basic Dental Materials Science | **77** | **10** | **3** |
| 5 | Legislation, Professionalism and Ethics in Dentistry | **54** | **10** | **3** |
| 6 | Dental Public Health and Preventative Dentistry | **26** | **5** | **3** |
| 7 | Removable Complete Prosthodontics | **30** | **15** | **3** |
| 8 | Removable Partial Prosthodontics | **115** | **15** | **3** |
| 9 | Dental Laboratory Compliance | **70** | **10** | **3** |
| 10 | Design of Fixed Prosthodontics | **70** | **10** | **3** |
| 11 | Complex Dental Materials Science | **70** | **10** | **3** |
| 12 | Techniques for Manufacturing Fixed Prosthodontics | **120** | **15** | **3** |
| 13 | Orthodontic Therapy Principles | **30** | **5** | **3** |
| 14 | Design, Manufacture and Modification of Orthodontic Appliances | **86** | **15** | **3** |
| 15 | Advanced Dental Technology Techniques and Procedures | **70** | **10** | **3** |
| 16 | Work-based Learning in Dental Technology | **20** | **10** | **3** |

# Assessment and grading

All units are internally assessed in the BTEC qualifications in this specification.

All assessment for the BTEC qualifications in this specification is criterion referenced, based on the achievement of specified learning outcomes. Each unit has specified assessment and grading criteria which are to be used for grading purposes. A summative unit grade can be awarded at pass, merit or distinction.

- To achieve a 'pass' a learner must have satisfied **all** the pass assessment criteria.
- To achieve a 'merit' a learner must additionally have satisfied **all** the merit grading criteria.
- To achieve a 'distinction' a learner must additionally have satisfied **all** the distinction grading criteria.

Learners who complete the unit but who do not meet all the pass criteria are graded 'unclassified'.

## Grading domains

The grading criteria are developed in relation to grading domains which are exemplified by a number of indicative characteristics at the level of the qualification.

There are four BTEC grading domains:

- application of knowledge and understanding
- development of practical and technical skills
- personal development for occupational roles
- application of generic skills.

Please refer to *Annexe A* which shows the merit and distinction indicative characteristics.

## Guidance

The purpose of assessment is to ensure that effective learning has taken place to give learners the opportunity to:

- meet the assessment and grading criteria; and
- achieve the learning outcomes in the units.

All the assignments created by centres should be reliable and fit for purpose,

and should build on the assessment and grading criteria. Assessment tasks and activities should enable learners to produce valid, sufficient and reliable evidence that relates directly to the specified criteria. Centres should enable learners to produce evidence in a variety of different forms and including written reports, graphs and posters, along with projects, performance observation and time-constrained assessments.

Centres are encouraged to emphasise the practical application of the assessment and grading criteria, providing a realistic scenario for learners to adopt, and making maximum use of practical activities and work experience. It is important that assignments are fit for purpose as they are vital to achievement.

The assessment and grading criteria must be clearly indicated in the fit-for-purpose assignments. This gives learners focus and helps with internal verification and standardisation processes. It will also help to ensure that learner feedback is specific to the assessment and grading criteria.

When looking at the assessment and when designing assignments, centres are encouraged to identify common topics and themes.

The units include guidance on appropriate assessment methodology. A central feature of vocational assessment is that it allows for assessment to be:

- current, i.e. to reflect the most recent developments and issues
- local, i.e. to reflect the employment context of the delivering centre
- flexible to reflect learner needs, i.e. at a time and in a way that matches the learner's requirements so that they can demonstrate achievement.

# Calculation of the qualification grade

## Pass qualification grade

Learners who achieve the minimum eligible points specified by the rule of combination will achieve the qualification at pass grade (see *Structure of the Pearson BTEC Level 3 qualifications* in this specification).

## Qualification grades above pass grade

Learners will be awarded a merit or distinction or distinction* qualification grade (or combination of these grades appropriate to the qualification) by the aggregation of points gained through the successful achievement of individual units. The number of points available is dependent on the unit level and grade achieved, and the credit size of the unit (as shown in the *points available for unit credits achieved at different levels and unit grades* below).

### Points available for credits achieved at different QCF levels and unit grades

The table below shows **the number of points scored per unit credit** at the unit level and grade.

| | Points per unit credit | | |
|---|---|---|---|
| **Unit level** | **Pass** | **Merit** | **Distinction** |
| Level 2 | 5 | 6 | 7 |
| Level 3 | 7 | 8 | 9 |
| Level 4 | 9 | 10 | 11 |

Learners who achieve the correct number of points within the ranges shown in the 'qualification grade' table will achieve the qualification merit or distinction or distinction* grade (or combinations of these grades appropriate to the qualification).

## Qualification grade

### BTEC Level 3 Diploma

| Points range above pass grade | Grade | |
|---|---|---|
| 460-499 | Merit | M |
| 500-519 | Distinction | D |
| 520 and above | Distinction* | D* |

### BTEC Level 3 Extended Diploma

| Points range above pass grade | Grade |
|---|---|
| 1300-1339 | MPP |
| 1340-1379 | MMP |
| 1380-1419 | MMM |
| 1420-1459 | DMM |
| 1460-1499 | DDM |
| 1500-1529 | DDD |
| 1530-1559 | DDD* |
| 1560-1589 | DD*D* |
| 1590 and above | D*D*D* |

Please refer to *Annexe G* for examples of calculation of qualification grade above pass grade.

# Quality assurance of centres

Pearson's qualification specifications set out the standard to be achieved by each learner in order for them to gain the qualification. This is done throughout the learning outcomes, and assessment and grading criteria in each unit. Further guidance on delivery and assessment is given in the *Essential guidance for tutors* section in each unit. This section is designed to provide guidance related to the unit to support tutors, deliverers and assessors and to provide coherence of understanding and a consistency of delivery and assessment.

## Approval

Centres that have not previously offered BTEC qualifications will first need to apply for, and be granted, centre approval before they can apply for approval to offer the programme.

When a centre applies for approval to offer a BTEC qualification they are required to enter into an approvals agreement.

The approvals agreement is a formal commitment by the head or principal of a centre to meet all the requirements of the specification and any linked codes or regulations. Sanctions and tariffs may be applied if centres do not comply with the agreement. Ultimately, this could result in the suspension of certification or withdrawal of approval.

Centres will be allowed 'accelerated approval' for a new programme where the centre already has approval for a programme that is being replaced by the new programme.

The key principles of quality assurance are that:

- a centre delivering BTEC programmes must be an approved centre and must have approval for programmes, or groups of programmes, that it is operating
- the centre agrees, as part of gaining approval, to abide by specific terms and conditions around the effective delivery and quality assurance of assessment; it must abide by these conditions throughout the period of delivery
- Pearson makes available to approved centres a range of materials and opportunities intended to exemplify the processes required for effective assessment and examples of effective standards. Approved centres must use the materials and services to ensure that all staff delivering BTEC qualifications keep up to date with the guidance on assessment
- an approved centre must follow agreed protocols for standardisation of assessors and verifiers; planning, monitoring and recording of assessment processes; and for dealing with special circumstances, appeals and malpractice.

The approach of quality assured assessment is made through a partnership between an approved centre and Pearson. We are committed to ensuring that it follows best practice and employs appropriate technology to support quality assurance processes where practicable. Therefore, the specific arrangements for working with centres will vary. We seek to ensure that the quality assurance processes that it uses do not place undue bureaucratic processes on centres and works to support centres in providing robust quality assurance processes.

Pearson monitors and supports centres in the effective operation of assessment and quality assurance. The methods which we use to do this for these BTEC programmes include:

- ensuring that all centres have completed appropriate declarations at the time of approval, undertaking approval visits to centres where necessary

- the requirement that requiring all centres to appoint a lead internal verifier for designated groups of programmes and to ensure that this person is trained and supported in carrying out that role that the lead Internal Verifier is trained and supported in carrying out the role
- the requirement that the lead internal verifier completes compulsory online standardisation related to assessment and verification decisions for the designated programme
- assessment sampling and verification, through requested samples of assessments, completed assessed learner work and associated documentation
- overarching review and assessment of a centre's strategy for assessing and quality assuring its BTEC programmes.

### Pearson Vocational Quality Assurance Handbook

Centres should refer to the *Pearson Quality Assurance Handbook* for detailed guidance.

An approved centre must make certification claims only when authorised by Pearson and strictly in accordance with requirements for reporting.

Centres that do not fully address and maintain rigorous approaches to quality assurance will be prevented from seeking certification for individual programmes or for all BTEC programmes. Centres that do not comply with remedial action plans may have their approval to deliver qualifications removed.

#### Pearson BTEC Centre Guide to Internal Assessment

For further information regarding malpractice and appeals, please see Pearson's *BTEC Centre Guide to Internal Assessment*, available on our website.

# Programme design and delivery

The BTEC qualifications in this specification consist of mandatory units and optional units. Optional units are designed to provide a focus to the qualification and more specialist opportunities in the sector.

In BTEC qualifications each unit has a number of **Guided Learning Hours** and centres are advised to keep this in mind when planning the programme of study associated with this specification take this into account when planning the programme of study associated with this specification.

## Mode of delivery

Pearson does not define the mode of study for the BTEC qualifications in this specification. Centres are free to offer the qualifications using any mode of delivery (such as full time, part time, evening only or distance learning) that meets their learners' needs. Whichever mode of delivery is used, centres must ensure that learners have appropriate access to the resources identified in the specification and to the subject specialists delivering the units. This is particularly important for learners studying for the qualification through open or distance learning.

Learners studying for the qualification on a part-time basis bring with them a wealth of experience that should be used to maximum effect by tutors and assessors. The use of assessment evidence drawn from learners' work environments should be encouraged. Those planning the programme should aim to enhance the vocational nature of the qualification by:

- liaising with employers to ensure that the course is relevant to learners' specific needs
- accessing and using non-confidential data and documents from learners' workplaces

- including sponsoring employers in the delivery of the programme and, where appropriate, in the assessment
- linking with company-based/workplace training programmes
- making full use of the variety of experience of work and life that learners bring to the programme.

## Resources

The BTEC qualifications in this specification are designed to prepare learners for employment in specific occupational sectors. Physical resources need to support the delivery of the programme and the proper assessment of the learning outcomes and should, therefore, normally be of industry standard. Staff delivering programmes and conducting the assessments should be familiar with current practice and standards in the sector concerned and ensure the involvement of registered dental technicians in the delivery of units where appropriate. Centres will need to meet any specific resource requirements to gain approval from Pearson.

Where specific resources are required these have been indicated in individual units in the *Essential resources* sections.

## Delivery approach

It is important that centres develop an approach to teaching and learning that supports the specialist vocational nature of BTEC qualifications and the mode of delivery. Specifications give a balance of practical skill development and knowledge requirements, some of which can be theoretical in nature. Tutors and assessors need to ensure that appropriate links are made between theory and practical application and that the knowledge base is applied to the sector. This requires the development of relevant and up-to-date teaching materials that allow learners to apply their learning to actual events and activity within the sector. Maximum use should be made of the learner's experience.

An outline learning plan is included in every unit as guidance to demonstrate one way of planning the delivery and assessment of the unit. The outline learning plan can be used in conjunction with the programme of suggested assignments.

Where the qualification has been designated and approved as a Technical Certificate and forms part of an Apprenticeship scheme, particular care needs to be taken to build strong links between the learning and assessment for the BTEC qualification and the related NVQs and Functional Skills that also contribute to the scheme.

## Meeting local needs

Centres should note that the qualifications set out in this specification have been developed in consultation with centres, employers and the Sector Skills Councils or standards setting bodies for the relevant sector. To meet learners' needs, and local skills and training needs, centres should make maximum use of the choice available to them in the optional units. However, in certain circumstances, the optional units given in this specification might not allow centres to meet a local need. In this situation, centres are allowed to seek approval to use units from other BTEC (QCF) qualifications; this is called Meeting Local Needs (MLN).

The following conditions must be met when using units from other BTEC (QCF) qualifications for MLN purposes:

- centres must seek approval from Pearson before delivering or assessing units from other qualifications, they must do this before 31st January in each academic year
- MLN units cannot replace mandatory units

- units must be from BTEC (QCF) qualifications only
- the coherence, purpose and vocational focus of the qualifications must be maintained
- the content of MLN units cannot overlap with content in units already available in the qualification structure
- the number and level of units used must comply with the rules set out in the qualification structures.

**The process of seeking MLN approval:**

- check the rules for MLN in the specification
- submit an MLN request to Pearson. This should outline the rationale for the proposed units, explaining how the change is important for learners and how the viability and vocational purpose of the qualification will be retained
- wait for approval from Pearson before delivering or assessing the units.

For the Level 3 qualifications in this specification, the meeting local needs allowance for each qualification size is:

**Pearson BTEC Level 3 Diploma in Dental Technology (QCF)**

This qualification is not designed to include credit from other Level 3 BTEC units.

**Pearson BTEC Level 3 Extended Diploma in Dental Technology (QCF)**

This qualification is not designed to include credit from other Level 3 BTEC units.

## Functional Skills

The BTEC qualifications in this specification give learners opportunities to develop and apply Functional Skills.

Functional Skills are offered as stand-alone qualifications at Level 2. See individual units for opportunities to cover ICT, Mathematics and English Functional Skills.

## Personal, learning and thinking skills

Opportunities are available to develop personal, learning and thinking skills (PLTS) within a sector-related context. PLTS are identified in brackets after the unit pass criteria to which they are associated and they are also mapped in *Annexe B*. Further opportunities for learners to demonstrate these skills may arise as they progress through their learning.

# Access and recruitment

Pearson's policy regarding access to its qualifications is that:

- they should be available to everyone who is capable of reaching the required standards
- they should be free from any barriers that restrict access and progression**
- there should be equal opportunities for all wishing to access the qualifications.

Centres are required to recruit learners to BTEC qualifications with integrity. This will include ensuring that applicants have appropriate information and advice about the qualification and that the qualification will meet their needs. Centres should take appropriate steps to assess each applicant's potential and make a professional judgement about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult Pearson's policy on learners with particular requirements.

Centres will need to review the entry profile of qualifications and/or experience held by applicants, considering whether this profile shows an ability to progress to a Level 3 qualification. For learners who have recently been in education, the profile is likely to include one of the following:

- a BTEC Level 2 qualification in Dental Technology or a related vocational area
- a standard of literacy and numeracy supported by a general education equivalent to four GCSEs at grade 9-4
- other related Level 2 qualifications
- related work experience.

More mature learners may present a more varied profile of achievement that is likely to include experience of paid and/or unpaid employment.

**** It should be noted that achievement of the BTEC Level 3 Extended Diploma in Dental Technology does not automatically lead to registration with the General Dental Council (GDC).**

## Restrictions on learner entry

Most BTEC Level 3 qualifications are for learners aged 16 years and over.

In particular sectors, the restrictions on learner entry might also relate to any physical or legal barriers, for example, people working in health, care or education are likely to be subject to Disclosure and Barring Service (DBS) checks.

The BTEC qualifications in this specification are listed on the DfE funding lists under Section 96 of the Learning and Skills Act 2000.

## Access to qualifications and assessments

We are committed to working with centres that deliver our qualifications to ensure that duties under the Equality Act 2010 (UK) and any other equalities legislation relevant in the UK are fulfilled. Our equality policy requires all learners to have equal opportunity to access our qualifications and assessments, and that our qualifications are awarded in a way that is fair to every learner.

We are committed to making sure that:

- when they are undertaking one of our qualifications, learners with a protected characteristic are not disadvantaged in comparison with learners who do not share that characteristic
- all learners achieve the recognition they deserve from undertaking a qualification and that this achievement can be fairly compared to the achievement of their peers.

Further information on access arrangements can be found in the Joint Council for Qualifications (JCQ) document *Access Arrangements, Reasonable Adjustments and Special Consideration*.

Details on how to make adjustments for learners with protected characteristics are given in the policy document *Reasonable Adjustment and Special Considerations for BTEC and Pearson NVQ Qualifications*, which can be found on our website.

## Recognition of Prior Learning

Recognition of Prior Learning (RPL) is a method of assessment (leading to the award of credit) that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and so do not need to develop through a course of learning.

Pearson encourages centres to recognise learners' previous achievements and experiences whether at work, home and at leisure, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning.

RPL enables recognition of achievement from a range of activities using any valid assessment methodology. Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be valid and reliable.

# Unit format

All units in BTEC Level 3 qualifications have a standard format. The unit format is designed to give guidance on the requirements of the qualification for learners, tutors, assessors and those responsible for monitoring national standards.

Each unit has the following sections.

## Unit title

The unit title will appear on the learner's Notification of Performance (NOP).

## Level

All units and qualifications will have a level assigned to them, which represents the level of achievement. There are nine levels of achievement, from Entry Level to Level 8. The level of the unit has been informed by the QCF level descriptors and, where appropriate, the National Occupational Standards (NOS) and/or other sector/professional benchmarks.

## Credit value

Each unit in BTEC qualifications has a credit value related to the size of the unit.

A credit value specifies the number of credits that will be awarded to a learner who has met all the learning outcomes of the unit.

## Guided Learning Hours

Guided Learning Hours for the unit as defined on page 2.

## Aim and purpose

The aim is a succinct statement that summarises the learning outcomes of the unit.

## Unit introduction

The unit introduction gives the reader an appreciation of the unit in the vocational setting of the qualification, as well as highlighting the focus of the unit. It gives the reader a 'snapshot' of the unit and the key knowledge, skills and understanding gained while studying the unit. The unit introduction also highlights any links to the appropriate vocational sector by describing how the unit relates to that sector.

## Learning outcomes

Learning outcomes state exactly what a learner should 'know, understand or be able to do' as a result of completing the unit.

## Unit content

The unit content identifies the breadth of knowledge, skills and understanding needed to design and deliver a programme of learning to achieve each of the learning outcomes. The content provides the range of subject material for the programme of learning and specifies the skills, knowledge and understanding required for achievement of the pass, merit and distinction grading criteria.

Each learning outcome is stated in full and then the key phrases or concepts related to that learning outcome are listed in italics followed by the subsequent range of related topics.

### Relationship between content and assessment criteria

The learner must have the opportunity within the delivery of the unit to cover all the unit content.

It is not a requirement of the unit specification that all the content is assessed. However, the indicative content will need to be covered in a programme of learning in order for learners to be able to meet the standard determined in the assessment and grading criteria. The merit and distinction grading criteria enable the learner to achieve higher levels of performance in acquisition of knowledge, understanding and skills.

### Content structure and terminology

The information below shows how unit content is structured and gives the terminology used to explain the different components within the content.

- Learning outcome: this is given in bold at the beginning of each section of content.
- Italicised sub-heading: it contains a key phrase or concept. This is content which must be covered in the delivery of the unit. Colons mark the end of an italicised sub-heading.
- Elements of content: the elements are in plain text and amplify the sub-heading. The elements must also be covered in the delivery of the unit. Semi-colons mark the end of an element.
- Brackets contain amplification of elements of content which must be covered in the delivery of the unit.
- 'e.g.' is a list of examples used for indicative amplification of an element (that is, the content specified in this amplification that could be covered or that could be replaced by other, similar material).

## Assessment and grading grid

Each grading grid gives the assessment and grading criteria used to determine the evidence that each learner must produce in order to receive a pass, merit or distinction grade. It is important to note that the merit and distinction grading criteria require a qualitative improvement in a learner's evidence and not simply the production of more evidence at the same level.

## Essential guidance for tutors

This section gives tutors additional guidance and amplification to aid understanding and a consistent level of delivery and assessment. It is divided into the following sections:

- *Delivery* – explains the content's relationship with the learning outcomes and offers guidance about possible approaches to delivery. This section is based on the more usual delivery modes but is not intended to rule out alternative approaches.
- *Outline learning plan* – the outline learning plan has been included in every unit as guidance and demonstrates one way in planning the delivery and assessment of a unit. The outline learning plan can be used in conjunction with the programme of suggested assignments.
- *Assessment* – gives amplification about the nature and type of evidence that learners need to produce in order to pass the unit or achieve the higher grades. This section should be read in conjunction with the grading criteria.
- *Programme of suggested assignments* – the table shows how the suggested assignments match and cover the assessment grading criteria.
- *Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications* – sets out links with other units in the qualification. These links can be used to ensure that learners make connections between units, resulting in a coherent programme of learning. The links show opportunities for integration of learning, delivery and assessment.
- *Essential resources* – identifies any specialist resources needed to allow learners to generate the evidence required for each unit. The centre will be asked to ensure that any requirements are in place when it seeks approval from Pearson to offer the qualification.
- *Employer engagement and vocational contexts* – provides a short list of agencies, networks and other useful contacts for employer engagement and for sources of vocational contexts.
- *Indicative reading for learners* – gives a list of resource materials for learners that benchmark the level of study

# Units


| | | |
|---|---|---|
| Unit 1: | Dental Technology Fundamentals | 23 |
| Unit 2: | Medical Emergencies, First Aid and Communication in the Dental Team | 43 |
| Unit 3: | Dental Anatomy, Physiology and Disease | 61 |
| Unit 4: | Basic Dental Materials Science | 79 |
| Unit 5: | Legislation, Professionalism and Ethics in Dentistry | 95 |
| Unit 6: | Dental Public Health and Preventative Dentistry | 113 |
| Unit 7: | Removable Complete Prosthodontics | 125 |
| Unit 8: | Removable Partial Prosthodontics | 139 |
| Unit 9: | Dental Laboratory Compliance | 155 |
| Unit 10: | Design of Fixed Prosthodontics | 173 |
| Unit 11: | Complex Dental Materials Science | 189 |
| Unit 12: | Techniques for Manufacturing Fixed Prosthodontics | 207 |
| Unit 13: | Orthodontic Therapy Principles | 223 |
| Unit 14: | Design, Manufacture and Modification of Orthodontic Appliances | 239 |
| Unit 15: | Advanced Dental Technology Techniques and Procedures | 257 |
| Unit 16: | Work-based Learning in Dental Technology | 271 |

# Unit 1: Dental Technology Fundamentals

**Unit reference number:** D/505/9558

**Level:** 3

**Credit value:** 15

**Guided learning hours:** 60

## Unit aim

The aim of this unit is to enable learners to gain knowledge and skills in fundamental dental technology techniques involved in the design, manufacture and modification of a range of custom-made dental devices.

## Unit introduction

This unit gives learners an insight into the techniques used to manufacture simple custom-made devices. It will give learners an understanding of current methods of construction, and materials used. Learners will also have the opportunity to design and construct simple appliances and gain basic skills using a wide range of dental biomaterials.

Learning outcome 1 gives learners the knowledge to carry out basic dental technology procedures. It looks at commonly used methods for the construction of dental models, special trays and registration blocks, their design requirements and the materials used in their production. It also includes techniques for using a variety of articulators.

For learning outcome 2, learners will construct the devices outlined in learning outcome 1 and carry out articulation techniques.

For learning outcomes 3, 4 and 5, learners will learn the techniques required to construct a range of custom-made dental devices, including a simple acrylic removable denture, a single-unit fixed prosthodontic and a simple removable orthodontic appliance.

Finally, for learning outcome 6 learners will carry out techniques for modifying removable prosthodontics.

Learners will be made aware of necessary prescription requirements, accepted professional standards and ethical behaviour, health and safety precautions and quality measures required to produce these appliances.

## Learning outcomes

### On completion of this unit a learner should:

1. Understand the basics of dental technology techniques
2. Be able to carry out basic dental technology technique procedures
3. Be able to construct a simple acrylic removable prosthodontic appliance
4. Be able to construct a single unit fixed prosthodontic
5. Be able to construct a simple removable orthodontic appliance
6. Be able to modify an existing prosthetic appliance

## Unit content

### 1 Understand the basics of dental technology techniques

*Process*: receipt of impressions or digital files; prescription interpretation and patient interests, dignity and choice; protect patient information; impression identification; impression checks; impression treatment prior to casting; cross- infection protocols, health and safety; communication and use of effective feedback; legal and ethical legislation and professional responsibility; GDC standards

*Properties of impression materials*: limitations; ideal properties; handling and disposal; decontamination and cross-infection control procedures

*Materials*: mucostatic; mucocompressive; impression pastes; putties; elastomers; silicones; disposal procedures; impression waxes

*Design requirements for dental models*: purpose of a model; model design, e.g. preliminary, study, master, orthodontic, and sectioned; construction techniques; material selection; anatomical requirements; base design; die design

*Design features of impression trays*: purpose of trays; tray design types, edentulous, partially dentate; relevance and importance of anatomical landmarks; peripheral outline; reasons for and design of spacers and stops; reasons for and design of handle and finger rests; retention aids

*Design requirements of record blocks*: cast analysis; peripheral outline; elimination of undercuts; materials selection; recording data registration; assessment of tooth position, e.g. occlusal record block or digital assessment of occlusion

*Articulators*: types, e.g. simple hinge, average value, semi adjustable, fully adjustable; uses; simulation of jaw movements; adjustments; interpretation and transfer of data from record blocks to articulator

### 2 Be able to carry out basic dental technology technique procedures

*Dental models*: digital or physical; initial preparation; casting impressions; selection and maintenance of equipment; mixing techniques; casting methods; model identification; trimming methods; sectioning methods; die trimming; model finishing; digital models; 3D printing

*Impression trays*: prescription interpretation; instruments and equipment; materials; model preparation; reason and techniques for spacers; material manipulation; trimming and finishing; quality assurance checks

*Record blocks:* uses; materials used; construction techniques for edentulous and partially dentate; rim height, width and position

*Articulation of models:* preparation of models; split cast technique; articulation techniques for removable prosthodontics, orthodontics, and fixed prosthodontics

**3 Be able to construct a simple acrylic removable prosthodontic appliance**

*Simple acrylic removable prosthodontic appliance:* an example of this could be a spoon denture or an acrylic denture with less than four replacement teeth; no cast metallic substructures are required

*Prescriptions and stages of construction:* interpretation of basic prescription requirements and terminology; understand the need to protect patient information; construction stages; faults occurring during construction

*Articulators:* types used in removable prosthodontics; articulating and mounting procedures

*Tooth selection and setting:* tooth selection by information from various sources; types available; shades and moulds of artificial teeth; cusp formations and measurements; tooth position and interdigitation

*Waxing procedures:* waxing up techniques; aesthetics; baseplate design and contours; surface finish and accuracy

*Processing dentures:* flasking preparations; flasking, packing and injection moulding techniques and systems; curing methods; costs compared; deflasking techniques; trimming and polishing; health and safety

*Remounting techniques and final checks:* re-establishing occlusion; final checks for fit and fitness for purpose; decontamination of dentures; Medical Devices Regulation (MDR); packing and dispatch of finished dentures

**4 Be able to construct a single-unit fixed prosthodontic**

*Single-unit prosthodontics:* for example a single-unit metallic substructure, metallic or zirconia/ceramic crown, a temporary restoration

*Prescriptions and terminology:* interpretation of basic prescription requirements and terminology

*Anterior and posterior single unit metallic substructures:* types, e.g. post and core, coping; die preparation; contouring and dimensions; lost wax techniques; finishing and metal preparation; health and safety; passing on for next process

*Metallic crowns:* die preparation; waxing up methods; anatomical considerations; dimensions and contours; lost wax techniques; trimming, polishing and fitting; health and safety; Medical Devices Regulation (MDR); packing and dispatching

*Temporary crowns:* design requirements; material selection; die preparation; construction techniques; trimming, polishing and finishing methods; health and safety; Medical Devices Regulation (MDR); packing and dispatching

**5 Be able to construct a simple removable orthodontic appliance**

*Orthodontic appliance:* for example a Hawley retainer, Begg retainer, an appliance with two Adams cribs and additional component, a vacuum-formed retainer

*Prescriptions and terminology*: interpretation of basic prescription requirements and terminology

*Baseplate:* simple baseplate design; construction techniques; trimming and polishing methods; correcting faults

*Direct retaining components (clasps):* purpose of clasps; types of clasp; wire bending techniques; positioning and fixing prior to spraying up

*Finishing and final checks:* baseplate and metallic component checks; baseplate and component fit to model; decontamination of appliance; Medical Devices Regulation (MDR); packing and dispatch of finished appliance

**6 Be able to modify an existing prosthetic appliance**

*Removable appliance modification*: an example of this could be the addition, repair or relining of a denture

*Receiving cases:* checking dentures and accepting contract; decontamination of dentures

*Denture relining:* reasons for relining; material selection; construction techniques; health and safety

*Remounting and final checks:* remounting techniques; final checks of dentures and fit to model; decontamination of dentures; Medical Devices Regulation (MDR); packing and dispatch of modified dentures

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 compare the different types of dental models | M1 discuss the design criteria for each type of dental model | D1 evaluate the effect that poorly constructed dental models have on the outcome of a dental device |
| P2 explain the selection and use of different types of dental impression materials | M2 describe the classification of dental impression materials | D2 evaluate currently used dental impression materials |
| P3 compare the different types of custom-made impression trays | M3 discuss the design requirements for custom-made impression trays | D3 evaluate the effect that a poorly constructed tray can have on the outcome of the completed appliance |
| P4 explain the uses of record blocks in the construction of full and partial removable prosthodontics devices | M4 assess the design requirements of record blocks for edentulous and partially dentate patients | D4 analyse how data registered on a record block is used in the construction of a dental device |
| P5 classify the different types of dental articulators | M5 discuss how models are articulated to the different types of dental articulator | D5 evaluate the effectiveness of the simulated jaw movement of the different types of articulators |
| P6 construct dental models to a fit for purpose standard<br>[CT2, RL4, SM3] | | |



| Assessment and grading criteria | | |
|---|---|---|
| P7 construct custom-made impression trays to a fit for purpose standard [CT2, RL4, SM3] | | |
| P8 construct record blocks to a fit for purpose standard [CT2, RL4, SM3] | | |
| P9 articulate models for the production of dental devices to a fit for purpose standard [CT2, RL4, SM3] | | |
| P10 construct a simple acrylic denture to a fit for purpose standard [SM2, SM3] | M6 justify the procedures involved in the construction of a simple acrylic denture | |
| P11 construct a simple single unit fixed prosthodontic restoration to a fit for purpose standard [CT2, RL4, SM3] | M7 justify the construction technique used in the lost wax process for the manufacture of single unit prosthodontics | |
| P12 construct a simple removable orthodontic appliance to a fit for purpose standard [CT2, RL4, SM3] | M8 justify the construction technique used to manufacture a simple removable orthodontic appliance | |
| P13 modify a simple prosthetic appliance to a fit for purpose standard [SM4] | M9 justify the technique used to repair an acrylic appliance | |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

Delivery of this unit encourages a variety of teaching methods and resources. Site visits from subject specialists are recommended. Assessment of the unit requires learners to provide evidence using a range of assessment methods.

### Delivery

Tutors delivering this unit have opportunities to use a wide variety of techniques.

Lectures, practical demonstrations, discussions, seminar presentations, research using the internet and/or library resources, and the use of personal laboratory experience are all suitable. Delivery should encourage learners to be enthusiastic about their new profession. It should motivate them to find out more information and improve their skills through reflective professional practice, while ensuring implementation of ethical expectations.

Work placements should be monitored regularly to ensure the quality of the learning experience. Learners and supervisors should be made aware of the requirements of this unit prior to any work-related activities, so that naturally occurring evidence can be collected at the time. Learners should be encouraged to keep a notebook in which to record all completed practical work.

Learning outcomes 1 and 2 are directly linked. They are likely to be delivered through formal lectures, demonstrations, discussions, work placements and independent learner research. Learners need to understand professional practice, interpret prescription requirements and to be aware of the design requirements of impression materials, dental models, impression trays and record blocks. They need to learn the reasons for design, materials used and the construction requirements. They will also need to find out how record blocks are used in the articulation of dental models as well as the health and safety requirements and quality assurance procedures necessary to ensure patient safety and satisfaction. Visits to clinical environments to meet with patients and other dental care professionals would be beneficial at this stage of the learning process.

Learning outcome 3 could be delivered by formal lectures, practical demonstrations, group discussions, work placements, practical tasks and independent learner research. Learners will identify and follow simple prescription instructions and basic dental terminology. Health and safety issues must be addressed before learners use dental materials and equipment prior to undertaking a given task. Adequate personal protective equipment (PPE) must be provided and used for practical tasks. Visiting expert speakers could add to the relevance of the subject for learners. For example, a prosthetic dental technician from a private or hospital dental laboratory or a dental company representative could talk about their work, the situations they face, materials available, the methods they use or systems they sell to construct simple acrylic dentures.

Learning outcome 4 introduces learners to fixed prosthodontics and the commonly used construction methods for simple, single unit restorations. Learners should be given opportunities to develop and improve their practical skills. A visit to a local dental practice or dental hospital clinic to observe simple, single unit fixed prosthodontic work being carried out on a patient would be helpful.

Learning outcome 5 introduces learners to the construction techniques required to produce a simple removable orthodontic appliance.

Work placements in an orthodontic laboratory would form part of, and enhance, the learning experience. Health and safety issues must be addressed and adequate PPE must be provided and used before learners undertake any practical tasks.

Learning outcome 6 enables learners to understand the methods used and the reasons for modifying existing simple prosthetic appliances. Learners should take account of the professional and ethical expectations that apply when dealing with a patient's repairs. Forms of delivery should include formal lectures, practical demonstrations, practical tasks, group discussions and independent learner research. Adequate PPE should be provided for practical tasks.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcomes 1 and 2** | |
| *Understand the basics of dental technology techniques:*<br>*Be able to carry out basic dental technology technique procedures:* | |
| Receipt of work, including prescription interpretation and impression checking prior to casting, professional and ethical standards | 1 |
| Discuss the main uses of impression materials | 1 |
| Demonstrate differing impression material mixing and processing techniques | 2 |
| Discuss impression-taking techniques that are carried out by clinical members of the dental team | 1 |
| Presentation on ideal properties of impression materials | 1 |
| Discuss the different classifications of impression materials and compare them against the ideal properties of impression materials | 1 |
| Examine the consequences of poor impression-taking techniques on the production of dental appliances | 1 |
| Discuss cross-infection and contamination regimes for impression materials and their safe handling | 1 |
| Introduction to the materials and equipment used in the construction of dental models and discuss health and safety procedures | 1 |
| Study the design requirements of dental models | 2 |
| Discuss construction techniques for dental models | 2 |
| Demonstrate mixing artificial stone and pouring impressions | 2 |
| Learners carry out the pouring of a range of impressions | 8 |
| Demonstrate trimming models and die preparation | 2 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Learners carry out the trimming of models and die preparation | 5 |
| Introduction to materials and equipment used in the construction of custom-made impression trays and health and safety procedures | 1 |
| Learners discuss design features of impression trays | 1 |
| Demonstrate the construction of a light-cured impression tray | 1 |
| Learners carry out the construction of light-cured impression trays | 2 |
| Demonstrate the construction of a shellac impression tray | 1 |
| Learners carry out the construction of shellac impression trays | 2 |
| **Assignment 1: Dental models and custom-made impression trays** (P1, P2, P3, P6, P7, M1, M2, M3, D1, D2, D3 ) | 6 |
| Introduction to the materials and equipment used in the construction of record blocks | 1 |
| Discuss the design requirements of record blocks | 1 |
| Demonstrate construction of edentulous upper shellac and lower wax-based record blocks | 1 |
| Learners carry out the construction of edentulous record blocks | 1 |
| Demonstrate construction of edentulous light-cure based record blocks | 1 |
| Learners carry out the construction of edentulous record blocks | 4 |
| Demonstrate construction of partially dentate record blocks | 1 |
| Learners carry out the construction of partially dentate record blocks | 4 |
| Discuss different types of articulator and explain their movements | 1 |
| Introduction to the procedures used in the articulation of dental models | 4 |
| Demonstrate articulation using a plane line articulator | 1 |
| Demonstrate articulation of dental models using average value articulators | 1 |
| Learners carry out the articulation of dental models | 4 |
| **Assignment 2: Record blocks and articulation** (P4, P5, P8, P9, M4, M5, D4, D5) | 4 |
| **Learning outcome 3** | |
| *Be able to construct a simple acrylic removable prosthodontic appliance:* Theory and practical exercise related to simple acrylic removable prosthodontics | |
| Introduction to the materials and equipment used in the manufacture of a simple acrylic removable prosthodontic appliance | 1 |
| Interpretation of prescriptions | 1 |
| Mounting models for denture production | 1 |
| Selection of mould size and shade of teeth | 1 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Tooth positioning and waxing of dentures<br>Flasking and packing techniques<br>Acrylic processing, trimming and polishing techniques<br>Health and safety<br>Learners carry out the manufacture of a simple acrylic denture | 1<br>1<br>1<br><br>7 |
| **Assignment 3: Manufacturing processes and construction of a simple acrylic removable prosthodontic device** (P10, M6) | 7 |
| **Learning outcome 4** | |
| *Be able to construct a single unit fixed prosthodontic:*<br>Theory and practical exercise related to single-unit fixed prosthodontic appliance | |
| Introduction to the materials and equipment used in the manufacture of a single-unit fixed prosthodontic device | 1 |
| Prescription requirements | 1 |
| Die preparation | 1 |
| Wax pattern design | 1 |
| Spruing and investing methods | 1 |
| Furnace burnout and casting | 1 |
| Fitting and finishing procedures | 2 |
| Demonstration of construction of single unit restoration | 6 |
| Construction of single-unit restoration by learners | |
| **Assignment 4: Manufacturing procedure and construction of a single-unit fixed prosthodontics** (P11, M7) | 4 |
| **Learning outcome 5** | |
| *Be able to construct a simple removable orthodontic appliance:* | |
| Theory and practical exercise related to simple removable orthodontic appliance design | 1 |
| Prescription requirement | 1 |
| Simple baseplate design | 1 |
| Wire bending techniques | 1 |
| Purpose of clasps | 1 |
| Trimming and polishing methods | 1 |
| Demonstration of construction techniques for orthodontic appliance | 2 |
| Learners construct simple orthodontic appliance | 6 |
| **Assignment 5: Simple removable orthodontic appliance design and construction** (P12, M8) | 6 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 6** | |
| *Be able to modify an existing prosthetic appliance:* | |
| Theory and practical exercise related to modifying an existing prosthetic appliance | 1 |
| Receipt of case and accepting contract, professional and ethical expectations | 1 |
| Relevant aspects of health and safety, Medical Devices Regulation (MDR) | 1 |
| Reason for modification and material selection | 1 |
| Demonstration of modification of a simple denture | 1 |
| Learners to modify a simple prosthetic appliance | 4 |
| **Assignment 6: Relining simple acrylic appliance** (P13, M9) | 7 |
| **Total learning time hours** | **147** |

## Assessment

To achieve a **pass** grade, learners must achieve **all 13** pass criteria as outlined in the grading grid. To achieve a **merit** grade for the unit, learners must achieve all of the **pass** grade criteria and **all nine** merit grade criteria. To achieve a **distinction** grade for the unit, learners must achieve all of the merit grade criteria and **all five** distinction grade criteria.

For P1, learners must compare the different types of dental models by their area of use, function and choice of material. This could be evidenced with a summative explanation, including images and diagrams of a selection of dental models, i.e. study models, preliminary models, master models, orthodontic study models and conservation models with trimmed dies or digital models.

For P2, learners must explain the selection and use of different types of dental impression materials that are currently available. Learners will be expected to include the range of impression materials used in the dental surgery. Evidence for this could take the form of a case study investigating materials commonly used in dentistry.

P3 requires learners to compare different types of custom-made impression trays by taking into consideration materials used, for example light cured, and the function and dental specialism they are used in, for example fully edentulous, partially dentate. Sectional evidence could be provided in the form of a written report using charts and diagrams, a pictorial presentation with an explanation, or an annotated poster or leaflet.

P4 requires learners to explain how record blocks are used to gather registration data in order to construct prosthodontics. This should include vertical dimension, lip line, occlusal plane, etc. Evidence could be provided in the form of a written report with diagrams, an annotated poster or leaflet.

For P5, learners need to classify the different types of dental articulators. Evidence should include classification, ability to reproduce jaw movement, dental disciplines for which they are used, arcon and non-arcon. Evidence may be provided in the form of a written report with diagrams and illustrations.

P6 requires learners to construct dental models from each dental discipline that are fit for purpose, fulfilling all health and safety and quality assurance requirements. The criterion could be assessed directly by the tutor during practical activities or through learners submitting practical work to be formally assessed. Direct assessment should be backed up with observation records completed by learners and the tutor.

For P7, learners must construct custom-made impression trays using a range of recognised materials and techniques as referred to in P3. Tutors should identify objectives, which are likely to be driven by the requirements of the Medical Device Directive. This could be assessed by the tutor during practical activities and presented practical work. The evidence could be in the same format as for P6.

For P8, learners must construct record blocks using recognised materials and techniques, for example record blocks with different base plate and block materials, strengtheners and full and partial designs. Tutors should identify the objectives, which are likely to be driven by the requirements of the Medical Device Directive. This could be assessed by the tutor during practical activities and presented practical work. Evidence could be in the same format as for P6.

For P9, learners are required to articulate a range of models from various dental disciplines, for example edentulous, orthodontic study models, using recognised techniques. Learners must use both simple and complex articulators. The practical work could be assessed as a single piece of work or as part of a larger practical assignment. Evidence could be in the same format as for P6.

P10 requires learners to construct a simple acrylic removable denture, from a given prescription. The constructed denture must be fit for purpose. Tutors should identify the objectives, which are likely to be driven by the requirements of the Medical Device Directive. This could be assessed by the tutor during practical activities and presented practical work. Evidence could be in the same format as for P6.

P11 requires learners to construct a single-unit fixed prosthodontic restoration from a given prescription. The constructed appliance must be fit for purpose. The appliance produced can be chosen from the devices listed in the content for learning outcome 4. The criterion could be assessed through learners submitting a practical piece of work to be formally assessed or assessed directly by the tutor during practical activities. For the latter, suitable evidence from guided activities would be observation records completed by learners and the tutor.

P12 requires learners to manufacture a simple removable orthodontic appliance, from a given prescription, using all health and safety requirements. The constructed appliance must be fit for purpose and have the most common direct retaining components and baseplate design incorporated in them. Evidence may be in the same format as for P6.

P13 requires learners to reline an existing prosthetic appliance, ensuring it is fit for purpose, using all health and safety requirements. Evidence can be in the same format as for P6.

For M1, learners must discuss the design criteria for the different types of dental models listed in P1. Evidence may be in the same format as for P1.

M2 requires learners to describe the classification of dental impression materials. This can be directly linked to P2 and could be assessed during work placement. If assessed this way witness statements should be provided by a suitable representative and verified by the tutor. The evidence presented must be broad ranging, realistic and feasible.

For M3, learners must discuss the design requirements for each type of custom-made impression tray. This can be linked directly to work carried out in P3. Evidence may be in the same format as for P1.

For M4, learners must assess the design requirements of record blocks. This can be directly linked to work undertaken for P4. Evidence may be in the same format as for P1.

For M5, learners must discuss the main features of the different types of dental articulator. This can be directly linked to work undertaken for P5. Evidence may be in the same format as for P1.

M6 requires learners to justify the procedures involved in the construction of a simple acrylic denture. This will include information to cover prescription requirements, health and safety, basic tooth selection and setting, waxing and processing procedures. Evidence could be in the form of a written document or a formal presentation.

For M7, learners must justify the construction technique used for the manufacture of a single unit fixed restoration. Evidence for this could be in the form of a report with diagrams, a pictorial presentation with explanations or an annotated poster and leaflet.

For M8, learners must justify the construction technique used to manufacture a simple removable orthodontic appliance. Learners need to show understanding of the design principles of the component parts of the device. Evidence could be in the form of a written report or presentation.

For M9, learners must justify the technique used to repair an acrylic appliance, with reference to professional practice.

D1 requires learners to evaluate the effect that poorly designed and constructed models can have on the outcome of a custom-made dental device. This can be linked directly to work carried out for P1 and M1. Evidence may be in the same format as for P1.

For D2, learners are required to evaluate current impression materials. Learners' evidence should be broad ranging and include an explanation of current impression materials used within dentistry. A link can be made to M2 and evidence provided may be in the same format.

For D3, learners must evaluate the effect that poorly designed and constructed custom-made impression trays can have on the outcome of the master model. This can be linked directly to work carried out for P3 and M3. Evidence may be in the same format as for P1.

For D4, learners must analyse how data registered on a record block is used in the construction of a dental appliance. This can be linked directly to work carried out for P4 and M4. Evidence may be in the same format as for P1.

For D5, learners must evaluate the effectiveness of the simulated jaw movement of the different types of dental articulator. This can be linked directly to work carried out for P5. Evidence may be in the same format as for P1.

## Programme of suggested assignments

The table below shows a *Programme of suggested assignments* that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, P2, P3, P6, P7, M1, M2, M3, D1, D2, D3 | Dental models and custom-made impression trays | You have started work in a dental laboratory. As a new employee you will start in the plaster room. Your mentor will demonstrate the use of the equipment and discuss health and safety precautions.<br>Included in the training will be instruction on dental impression materials.<br>The mentor will demonstrate mixing, pouring up and trimming models. You will be supervised until competent. You should keep notes of impression material selection and uses, preparation techniques and mixing ratios. When you have mastered dental models you move to the main laboratory were your mentor will explain the materials and equipment used in the construction of special trays. You will construct special trays and be supervised until competent. | • Written assignment<br>• Practical tasks |
| P4, P5, P8, P9, M4, M5,D4, D4 | Record blocks and articulation | You are in the main laboratory to construct record blocks and will be supervised until competent. In the plaster room your mentor will demonstrate articulation techniques using a range of articulators; you will be supervised articulating models. | • Written assignment<br>• Practical tasks |
| P10, M6 | Manufacturing processes and construction of a simple acrylic removable prosthodontic device | Your laboratory has asked you to produce a guide to the construction of simple acrylic dentures for use by students. | • Report and practical task |

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P11, M7 | Manufacturing procedure and construction of a single-unit fixed prosthodontic | Your laboratory has asked you to produce a guide to constructing single-unit metallic fixed prosthodontics for their trainees. You have also been asked to produce an example of the device for trainees to copy. | • Report and practical task |
| P12, M8 | Simple removable orthodontic appliance design and construction | You have received a prescription from a local dentist which requires you to construct an orthodontic retaining appliance for a patient. You have also been asked to write a guide, and include laboratory construction procedures. | • Report and practical task |
| P13, M9 | Repair of fractured denture | A patient has arrived at the dental laboratory and has requested a denture repair.<br>You have been asked to write a construction guide that will ensure that professional and ethical 'standards' are met when dealing with patients. | • Report and practical task |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 4: Basic Dental Materials Science |
| Unit 7: Removable Complete Prosthodontics |
| Unit 9: Dental Laboratory Compliance |
| Unit 10: Design of Fixed Prosthodontics |
| Unit 12: Techniques for Manufacturing Fixed Prosthodontics |
| Unit 14: Design, Manufacture and Modification of Orthodontic Appliances |

## Essential resources

Facilities required for this unit include a fully equipped dental laboratory. It should meet all health and safety legislation and be registered with the MHRA. The learner within the laboratory should have access to benching fitted with a hand piece and extractor unit. The laboratory should have a vacuum-mixing machine, a model trimmer, a light-cure box, Bunsen burner, polishing lathe and a selection of dental materials. The learner should be equipped with a dental toolkit and a selection of trimming burs.

Staff delivering this unit should be competent, experienced and registered with the General Dental Council. They should have recent laboratory experience within dental technology and show evidence of contact with the industry and evidence of continuing professional development.

Learners will need access to a library with a range of relevant books and journals.

## Employer engagement and vocational contexts

Where possible, learners should visit and gain work experience in both a private dental laboratory and a hospital dental laboratory as this will enable learners to obtain a balanced overview of the difference in service provision and work procedures carried out in these different working environments.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Creative thinkers | [CT2] Asking questions to clarify construction issues |
| Reflective learners | [RL4] Inviting feedback and using it as a means of improving their practical work |
| Self-managers | [SM3] Organising their time and resources when carrying out vocational tasks and practicals<br>[SM4] modifying a simple prosthetic appliance to a fit for purpose standard |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Effective participators | [EP3] Proposing practical ways forward with construction projects, breaking these into manageable steps |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Using in-house ICT systems to find information for assignments |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | |
| Manage information storage to enable efficient retrieval | Saving information and assignment work in a folder |
| Follow and understand the need for safety and security practices | Aware of keeping their password safe and not disclosing it to others |
| Troubleshoot | Able to identify a fault and know the procedure to report it |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Collecting information from books and journals |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Obtaining information from identified websites |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Making sure that the information they require is obtainable from a website, e.g. pictures of dental appliances and equipment |
| Bring together information to suit content and purpose | Creating a single document that has all the information for their work |
| Present information in ways that are fit for purpose and audience | Presenting the information from the document the way it has been requested in the brief |
| Evaluate the selection and use of ICT tools and facilities used to present information | Discussing how the document can be improved |

| Skill | When learners are … |
|---|---|
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Using email to send centre produced work to own address; keeping own messages safely in a folder; creating a contact list |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Discussing construction techniques for the practical tasks |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading hand outs given during discussions |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing their assignments |

# Unit 2: Medical Emergencies, First Aid and Communication in the Dental Team

**Unit reference number:** H/505/9559

**Level:** 3

**Credit value:** 10

**Guided learning hours:** 54

## Unit Aim

The aim of this unit is to enable learners to establish their responsibilities within the working environment, and to provide them with effective communication and ICT skills in the provision of oral healthcare. It will also instill an understanding of how to deal with medical emergencies and the health and safety regulations that govern dental personnel.

## Unit introduction

The study of behavioural science, communication skills and health informatics is essential for all dental studies. It is necessary that learners recognise different cultural and social backgrounds so as to enhance equality, diversity and rights within their working environment.

For learning outcome 1, learners will develop a knowledge and understanding of communication methods, and their importance in the provision of oral healthcare and treatment regimes. Learners will develop an awareness of how communication can be misinterpreted, and how this can cause barriers that affect both the patient and the dental team and lead to more complaints.

For learning outcome 2, learners will acquire skills in dealing with medical emergencies and the principles of basic first aid. They will learn about cardiac arrest, hyper and hypoglycaemia, epileptic seizures, upper respiratory obstruction, inhalation or ingestion of foreign bodies, anaphylactic reaction, cuts, burns, scalds and haemorrhaging, patient assessment, cardiopulmonary resuscitation (CPR), defibrillators and how to deal with these types of emergencies.

Learning outcome 3 is designed to develop learners' understanding of regulations for dental personnel. It covers first aid, health and safety, Control of Substances Hazardous to Health (COSHH) (2002), risk assessment, incident and accident reporting, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) (2013), and regulations for manual handling and lifting of heavy dental materials and equipment. It also covers portable appliance testing (PAT) and compliance with Health & Safety Executive (HSE) rules.

Learning outcome 4 will enable learners to gain an understanding of a range of information and communication technology resources that are used within a dental setting. They will learn how ICT is used to enhance communication within the dental workplace.

## Learning outcomes

### On completion of this unit a learner should:

1. Know how effective working relationships can be formed through a range of communication methods
2. Be able to demonstrate first aid procedures needed for medical emergencies in the clinical setting or dental laboratory
3. Understand the health and safety regulations that apply for dental laboratory personnel
4. Understand how information technology is incorporated in a clinical and dental laboratory environment

## Unit content

**1 Know how effective working relationships can be formed through a range of communication methods**

*Definition:* good communication (the transfer and receiving of timely information between individuals utilising appropriate methods to ensure professional working relationships)

*Internal communication barriers:* different cultural, social and ethnic minorities, impairments and disabilities such as hearing, sight, physical, age and learning difficulties; language, medication/drugs, smell, lighting, room ambience, temperature

*External communication barriers:* including background noise from equipment, traffic, aircraft, road works disruptions and distractions encountered specific to dentistry

*Recognition and management of patients:* accommodating specific patient needs and employing suitable methods to promote equality, diversity and rights, to show inclusion throughout treatment planning; communication with dental and other healthcare professionals; application of standards of care, including explaining options, preventative care, reassurance and behavioural techniques, obtaining valid consent, honesty and integrity, principles of candour and raising concerns about behaviour and performance

*Methods of communicating:* verbal and non-verbal; written format; telephone; information communication technology; body language; facial expressions; posture; pitch; tone and language; dress code; appraisal, professional discussions and feedback

**2 Be able to demonstrate first aid procedures needed for medical emergencies in the clinical setting or dental laboratory**

*Medical emergencies:* unconsciousness, e.g. fainting, shock, head injury, stroke, heart attack, asphyxia, poisoning; seizures, e.g. epileptic, hyperthermic, iatrogenic, hypo- and hyperglycaemia; airway and breathing problems, e.g. choking, asthma, hyperventilation; circulatory problems, e.g. angina, heart attack, shock, cardiogenic shock, neurogenic shock, anaphylactic shock; wounds and bleeding, e.g. types of wound abrasion, laceration, incision, puncture, amputation, contusion and types of bleeding, e.g. arterial, venous, capillary, effects of blood loss; burns and scalds, e.g. wet (heat) scalds, chemical burns, electrical burns, hot object burns; injuries to bones, the muscles and joints, e.g. fracture, dislocation, sprain, strain

*Signs and symptoms:* recognising risks; unconsciousness; airway and breathing problems; circulatory problems; wounds; internal and external bleeding; burns; scalds; injuries to bones; muscles; joints; diabetes; epilepsy; poisoning

*Principles of treatment:* patient assessment using ABCDE methodology (airway, breathing, circulation, disability, exposure); lifting and handling casualties; treatment and first aid (unconsciousness, airway and breathing problems, wounds, bleeding, burns, scalds, diabetes, epilepsy, poisons, injuries to bones, fractures and breaks), cardiopulmonary resuscitation (CPR) and defibrillation

**3 Understand the health and safety regulations that apply for dental laboratory personnel**

*Health and safety regulations:* Health and Safety at Work etc. Act (1974); The Health and Safety (First Aid) Regulations 1981; Approved Code of Practice and guidance

*Employers' and employees' responsibilities:* personal accountability; first-aid kits and expiry dates; first-aiders; reporting of incidents at work; Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR); accident book; first-aid patient-report form; governing body's requirements for practice

*Risk assessment:* recognising risks and appropriate management; regulations for manual handling and lifting of heavy dental materials and equipment, compliance with Health & Safety Executive (HSE), Control of Substances Hazardous to Health (COSHH) regulations 2002, Safety Data Sheets, Workplace Health, Safety and Welfare Regulations (1992); portable appliance testing (PAT)

**4 Understand how information technology is incorporated in a clinical and dental laboratory environment**

*How information technology and resources are used in the clinical setting:* storing; planning; updating medical records; digital images; arranging patient appointments; legal and statutory requirements for records; referrals and transfer of information via email

*How information technology and resources are used in the dental laboratory:* storing of clinician details for itemised billing for laboratory services; storing information based on material stock control; record and account details with dental manufacturing companies for purchasing equipment and materials; maintenance records; storing records for employees; personal details; salary; HM Revenue and Customs; national insurance; appraisal; disciplinary, the use of patient data in computer-aided design and manufacture (CAD/CAM); data protection; client/patient confidentiality

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 explain the methods of communication used to give, receive and retrieve information [IE1, IE3, IE5] | M1 discuss the impact of communication barriers in a dental setting and how complaints can be effectively managed | |
| P2 describe the barriers to communication within the dental laboratory environment [IE1, IE3, IE5] | | |
| P3 describe the importance of communication in forming and maintaining effective working relationships | | |
| P4 describe the types of medical emergency likely to occur in the dental laboratory environment [CT1] | M2 discuss the main symptoms associated with medical emergencies relevant to dentistry | D1 evaluate the application of the principles of first aid relating to medical emergencies |
| P5 explain how to deal with a range of medical emergencies likely to be presented in the dental laboratory environment [IE1, IE3, IE5] | | |
| P6 demonstrate principles of first aid including ABCDE, application of CPR and use of a defibrillator [TW1, TW3] | | |

| Assessment and grading criteria | | | | | |
|---|---|---|---|---|---|
| P7 | explain the key features of workplace health and safety regulations that apply to the dental laboratory [IE3, IE5, IE6] | M3 | compare the responsibilities that dental laboratory employers and employees have under the relevant health and safety legislation | D2 | discuss the possible consequences of a dental laboratory not complying with the relevant health and safety regulations |
| P8 | discuss the dental laboratory requirements for Reporting of Illnesses, Diseases and Dangerous Occurrences Regulations (RIDDOR) [IE3, IE5] | | | | |
| P9 | explain how the legislation relating to Control of Substances Hazardous to Health (COSHH) impacts on dental laboratories [IE3, IE5] | | | | |
| P10 | explain how portable appliance testing (PAT) can be effective in reducing accidents in a dental laboratory [IE3, IE5] | | | | |
| P11 | explain how Information Communication Technology (ICT) contributes to communication within the dental laboratory environment [IE1, IE4] | M4 | justify the benefits of using ICT resources in the clinical setting or dental laboratory [IE] | D3 | critically evaluate the impact of ICT resources in the clinical and dental laboratory environment and the future role of the dental technician [EP4] |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

The delivery of this unit should be designed to stimulate the learner using a wide variety of methods, including formal lectures, discussion, Q&A sessions, role play, practical activities and the use of ICT facilities. Site visits from subject specialists, such as St John Ambulance and Dental Community Health, are recommended. Assessment may take the form of viva voce, practical simulation, summative examination, and independent research in the form of written assignments.

## Delivery

This unit is designed to provide learners with a general knowledge and understanding of communication and maintaining effective working relationships between the patient, families, carers, dental clinicians and dental technicians.

The unit outlines possible medical emergencies that could be encountered by any member of the dental team. It is essential that learners develop practical ability, knowledge and understanding of first aid procedures and the confidence to apply them.

Tutors delivering this unit could consider integrating the delivery, private study and assessment relating to this unit with other relevant units in the qualification.

Delivery could be in the form of lectures, question and answer sessions, discussion, video, role play, practical activity, interactive programmes and research using CD ROM, the internet and library resources. It is important that resuscitation manikins are available so that learners can practise CPR techniques. Site visits to first aid approved training establishments, such as St John Ambulance, would be helpful. Some Primary Care Trusts in the hospital sector have simulation centres designed specifically for first aid training.

Learning outcome 1 could be delivered using formal lectures, videos, case studies, role play scenarios and group discussions applicable to addressing communication and barriers likely to be encountered in the clinical environment or dental laboratory. Recognition and management of patients and other healthcare professionals could be delivered as formal lectures by subject specialists from external agencies, such as Dental Community Health or National Health Service. Methods of communication can be delivered in a formal lecture or group discussion and should include use of ICT and presentation software. Also, for the successful completion of learning outcome 1, learners should carry out independent research and produce a written assignment.

Learning outcome 2 could be delivered via formal lectures, discussion, oral questioning, practical simulation, role play, video, interactive programmes, summative examination, and independent research for written assignments. Learners must be able to identify possible medical emergencies and respond by engaging in simulated practical activities of administering first aid, demonstrating knowledge, understanding and competency in initial assessment of airway, breathing, circulation, disability and exposure.

Learners must understand the importance of maintaining patient dignity and be able to administer CPR in an emergency situation, including using a defibrillator.

Learning outcome 3 covers all aspects of health and safety regulations including the recording of accidents at work, RIDDOR, safety data sheets, COSHH regulations, manual lifting, and compliance with HSE rules in respect of employer and employee and portable appliance testing (PAT).

Learning outcome 4 covers information technology and resources used in the dental profession and the future impact on the role of a dental technician. This could be delivered through formal lectures, discussion, oral questioning, work-based learning, and independent learner research for a written assignment.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Know how effective working relationships can be formed through a range of communication methods* | |
| Discussion with role play of methods of communication | 4 |
| Research and discuss barriers to communication | 3 |
| Recognise and discuss patient diversity and rights | 4 |
| Q&A, discussion and role play | 6 |
| Personal research and study time | 4 |
| **Assignment 1: Communication within the working environment** (P1, P2, P3, M1) | 8 |
| **Learning outcome 2** | |
| *Be able to demonstrate first aid procedures needed for medical emergencies in the clinical setting or dental laboratory* | |
| Introduction to medical emergencies | 4 |
| Recognise signs and symptoms | 4 |
| Demonstration of and participation in first aid procedures | 6 |
| Learners carry out oral questioning, practical simulation, role play, summative examination | 6 |
| Personal research and study time | 3 |
| **Assignment 2: Medical emergencies and first aid procedures within the dental environment** (P4, P5, P6, M2, D1) | 8 |
| **Learning outcome 3** | |
| *Understand the health and safety regulations that apply for dental laboratory personnel* | |
| Research regulations – RIDDOR, COSHH, HSE | 4 |
| Learners to discuss maintenance of electrical equipment (PAT) | 1 |
| Learners to discuss risk assessment for manual handling | 2 |
| Practical demonstration of and participation in manual handling techniques | 1 |
| Learner involvement in risk assessment in a dental laboratory environment | 1 |
| Ensure compliance with relevant governing body requirements | 1 |
| Personal research and study time | 2 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Assignment 3: Health and safety regulations that apply for dental laboratory personnel** (P7, P8, P9, P10, M3, D2) | 9 |
| **Learning outcome 4** | |
| *Understand how information technology is incorporated in a clinical and dental laboratory environment* | |
| Learners to carry out research into clinical ICT resources | 4 |
| Learners to use ICT research and discuss the impact of ICT within the dental laboratory | 4 |
| Personal research and study time | 4 |
| **Assignment 4: The utilisation of information technology within clinical and laboratory situations** (P11, M4, D3) | 7 |
| **Total learning time hours** | **100** |

## Assessment

Most of the evidence for this unit will be generated from written assignments designed to encapsulate the grading criteria for each of the four learning outcomes. Further evidence will be generated and documented by practical situations, group interaction and observations involving communication, body language, barriers and accidents likely to occur in a dental laboratory. Practical sessions in first aid, including the application of CPR and basic guidance on using a defibrillator, will be assessed by a summative test. It is advisable that assignments are designed to cover learning outcomes 1 to 4. The material for these assignments will be gained by formal study and from information researched and collated during private study.

To achieve a **pass** grade, learners must achieve **all 11** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all four** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all three** distinction criteria as outlined in the grading grid.

To achieve P1, learners must explain the use of various forms of communication, such as verbal, non-verbal (body language), perception of dress code, telephone, information technology, written communication and documentation, used to give, receive and retrieve information. Consideration is given to the style of questioning, listening, reflecting back, appropriate silences, zones of interaction, body language, facial expression and tone of voice.

To achieve P2, learners must describe barriers to communication that may be experienced within the dental laboratory environment. Consideration must be given to internal barriers from the patient or the healthcare provider, prejudice, assumption, labelling, judging, attitude, noise, room ambience, lighting, décor, dress code, smell as well as external barriers or things outside the control of the individual, such as background noise, distractions, language and interruptions, for example, road works, traffic noise, sirens/alarms, passing aircraft.

To achieve P3, learners need to describe the importance of communication in forming and maintaining effective working relationships in the clinical setting or the working environment of a dental laboratory. Consideration must be given to the implications of good communication and poor communication with both dental colleagues and customers.

To achieve P4, learners need to describe, and give examples of, the types of medical emergencies likely to occur in a dental laboratory.

To achieve P5, learners need to explain appropriate ways to deal with a range of medical emergencies described in P4. Learners should focus on realistic solutions, based on their own levels of knowledge and authority. Learners should also demonstrate awareness of when to refer an emergency to someone with higher authority.

To achieve P6, learners should demonstrate competence in applying the principles of first aid in simulated practical emergency situations. Whilst administering first aid, learners must demonstrate their underpinning knowledge and understanding of the principles and practice. Learners also need to be able to make an initial assessment of a situation through procedures such as ABCDE (airway, breathing, circulation, disability and exposure). Learners must also understand how to apply cardiopulmonary resuscitation (CPR) when required. The use of a manikin is essential for CPR training and confidence building in preparation for a live situation. Learners should have a basic knowledge in the use of a defibrillator.

To achieve P7, learners must explain the key features of health and safety in the workplace and the regulations that apply to the dental laboratory setting. This links to learning outcomes in *Unit 9: Dental Laboratory Compliance*. Learners must research the relevant regulations and present an account of their main points, explaining how each applies to the dental laboratory.

To achieve P8, learners need to discuss the dental laboratory requirements for Reporting of Illnesses, Diseases and Dangerous Occurrences Regulations (RIDDOR). They must consider the circumstances under which RIDDOR is triggered, the responsibilities for reporting and the procedures that must be followed. Learners also need to demonstrate understanding of the possible implications of not triggering RIDDOR correctly.

To achieve P9, learners need to explain how the legislation relating to Control of Substances Hazardous to Health (COSHH) affects the work of dental laboratories. This could be through a written report.

For P10, learners need to demonstrate their understanding of maintaining electrical equipment by portable appliance testing (PAT) to reduce the risk of accidents in a dental laboratory. Learners must explain the procedures for PAT and the possible implications to a dental laboratory of not following PAT procedures.

To achieve P11, learners must explain how the use of information and communication technology (ICT) can aid communication within the dental environment.

To achieve M1, learners must address communication barriers, such as a patient with hearing or visual impairment, learning or language difficulties, or where there are gender, age, cultural or ethnic differences. Such barriers could lead to complaints from patients, their carers or relatives. Learners must discuss how to avoid such complaints, and explain the correct procedures for dealing with complaints within the dental environment.

For M2 learners must discuss the main signs and symptoms of medical emergencies as identified in P4. They should consider the relevance and interrelationship of the symptoms they might be presented with.

To achieve M3, learners must compare in detail how health and safety legislation relates to employers' and employees' responsibilities, to include reporting of incidents at work, accident reports and first aid reporting. Examples of accident report forms and safety data sheets and maintenance of electrical equipment could be used.

To achieve M4, learners need to justify the benefits of using ICT resources in a clinical environment or dental laboratory. They must consider the jobs and processes within the dental laboratory that require the use of ICT and give arguments as to why it is beneficial to use ICT in these cases, for example, for accuracy of measurement or time-saving purposes. Learners may also justify the use of one ICT system over another.

To achieve D1, learners must evaluate the application of the principles of first aid relating to such medical emergencies as identified in P4 and M2. They should explore the strengths and weaknesses and significance of each principle of first aid as applied to different medical emergencies. Learners should also consider possible alternative actions where appropriate and draw conclusions.

To achieve D2, learners must discuss the consequences of failing to comply with the current regulations for health and safety in the workplace. This must include compliance with Health & Safety Executive (HSE) rules in respect of Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), Control of Substances Hazardous to Health (COSHH) and portable appliance testing (PAT). Learners should consider the implications for the individual and for the organisation as a whole.

To achieve D3, learners must critically evaluate the impact of ICT in dentistry and effects on employers and employees in a modern day dental laboratory. This could be through the compilation of a detailed report on the advantages and disadvantages of ICT, digital dentistry and the future role of the dental technician.

## Programme of suggested assignments

The table below shows a *Programme of suggested assignments* that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, P2, P3, M1 | Communication within the working environment | You are asked by the laboratory manager to prepare a client communication index for your establishment, including all the methods of communication that are available to each individual client. | • Research<br>• Written account<br>• Role-play scenarios |
| P4, P5, P6, M2, D1 | Medical emergencies and first aid procedures within the dental environment | Whilst in the laboratory, a member of staff collapses; as the identified first aider you have to assess the situation and then follow correct procedures for a medical emergency. When satisfactory measures have been taken, you have to write an accurate report. | • Viva voce<br>• Oral questioning<br>• Written account<br>• Summative examination<br>• Simulated practical |
| P7, P8, P9, P10, M3, D2 | Health and safety regulations that apply for dental laboratory personnel | As the identified health and safety officer in your establishment, one of your duties is to ensure that all relevant health and safety documentation is displayed and updated. This includes COSHH, risk assessment, accident and PAT documentation. | • Written account<br>• Research<br>• Risk assessments<br>• Safety data sheets<br>• Accident records |
| P11, M4, D3 | The utilisation of information technology within clinical and laboratory situations | Knowing that you are interested in computer technology, you are asked by your manager to research the various ICT systems that are available for use in the dental environment, and to make recommendations as to which system would benefit communication within the laboratory and the dental team. | • Research<br>• Written account<br>• Diagrams of equipment<br>• ICT specification data<br>• Use of ICT systems |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 5: Legislation, Professionalism and Ethics in Dentistry |
| Unit 7: Removable Complete Prosthodontics |
| Unit 8: Removable Partial Prosthodontics |
| Unit 12: Techniques for Manufacturing Fixed Prosthodontics |
| Unit 14: Design, Manufacture and Modification of Orthodontic Appliances |
| Unit 15: Advanced Dental Technology Techniques and Procedures |
| Unit 16: Work-based Learning in Dental Technology |

## Essential resources

Facilities required for this unit include basic first aid equipment and adult and infant resuscitation manikin dolls. A range of specialist visual aids of the human head and body and simulated anatomical skeletons is also required. Adequate library resources should be available with access to ICT facilities, the internet and a range of appropriate textbooks and journals.

Consideration should be given to room size to give learners enough space to practise resuscitation on manikins.

Staff delivering this unit should be competent, experienced and registered with the General Dental Council (GDC) and ideally possess a first aid certificate endorsed by St John Ambulance or an approved training establishment.

## Employer engagement and vocational contexts

Dental anatomy forms the basis of all dental technology techniques with regards to function and clinical suitability in the design and manufacture of custom-made dental devices. Where possible, learners should visit clinical and hospital departments, or have visiting specialist lecturers from such establishments. Where this is not possible, learners should be provided with appropriate case study materials and simulation.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are... |
|---|---|
| Independent enquirers | [IE1] Identifying the methods of communicating in giving, receiving and retrieving information<br>[IE3] Exploring the barriers to communication; describing suitable aspects of health and safety applicable to dentistry<br>[IE4] Analysing and evaluating how ICT methods, resources and equipment contribute to communication within the workplace<br>[IE5] Explaining how to deal with a range of medical emergencies likely to be presented in the dental laboratory environment<br>[IE6] Explaining how health and safety contributes to the continuing professional development of dental personnel |
| Creative thinkers | [CT1] Identifying medical emergencies relevant to dentistry |
| Team workers | [TW1, 3] Demonstrating principles of first aid, lifting and handling casualties, dressing and bandaging wounds |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are... |
|---|---|
| Creative thinkers | [CT1] Explaining how communication barriers can be recognised and managed to avoid complaints; describing the main symptoms of medical emergencies<br>[CT6] Adapting ideas for the specification of ICT resources for use in either the clinical environment or the dental laboratory |
| Reflective learners | [RL1] Assessing how the principles of first aid are related to medical emergencies |
| Effective participators | [EP1] Seeking resolutions for the process of complaint-handling<br>[EP4] Producing the specification for an ICT resource for use in either the clinical setting or the dental laboratory |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Using internet searches; entering data; word-processing documents to meet the requirements of assignments |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Producing a plan of tasks to be undertaken, reflecting on how the assignment is progressing |
| Manage information storage to enable efficient retrieval | Saving information in suitable files in suitable folders |
| Follow and understand the need for safety and security practices | Keeping food and drink away from computers; not using someone else's login; explaining how safety is addressed in the context of the tasks. ; explaining why the IT usage policy forbids certain actions |
| Troubleshoot | Carrying out checks to identify the source of a problem encountered, e.g. missing file of work |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Using suitable data from the internet, books and supplied by the tutor |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Searching for data; selecting appropriate data from existing ICT systems; evaluating whether it meets the requirements of the assignment task |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Ensuring all necessary information for the unit is available electronically, e.g. tables of information regarding ICT specifications, tables of numerical data, pictures of equipment |
| Bring together information to suit content and purpose | Collecting information in one file for editing into a suitable format |
| Present information in ways that are fit for purpose and audience | Presenting information in the formats required in the assignment briefs |

| Skill | When learners are… |
|---|---|
| Evaluate the selection and use of ICT tools and facilities used to present information | Evaluating whether the presentation of data is appropriate in terms of the grading criteria |
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Sending emails to tutors with appropriate information attached; demonstrating to tutors that email has been used appropriately; responding to feedback on assignments |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Taking part in class discussion; interacting with peers during role play; interacting with unit tutor during viva voce |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Using suitable terminology whilst writing an article |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Producing technically correct written articles and reports |

# Unit 3: Dental Anatomy, Physiology and Disease

**Unit reference number:** Y/505/9560

**Level:** 3

**Credit value:** 15

**Guided learning hours:** 54

## Unit Aim

The aim of this unit is to enable learners to explore the anatomical structures of the human skull and develop an understanding of dental anatomy, oral biology and associated diseases. It also links in the importance of the anatomical structures and features to the design and manufacture of custom-made dental devices.

## Unit introduction

The study of human dental anatomy and oral biology is an essential part of all dental studies. It is, therefore, widely accepted that learners studying dental technology should possess a fundamental knowledge and understanding of dental anatomy, oral biology and associated diseases. Knowledge of the structures and functions of the oral cavity lower facial third, the temporo mandibular joint and oro-facial musculature is essential to enable the dental technician to effectively communicate with other members of the dental team, and to facilitate the successful design and manufacture of custom-made dental devices.

This unit is designed to develop learners' knowledge and understanding of the human dentition, introducing learners to embryology, tooth eruption sequences, natural occlusion, tooth structure, tooth morphology and function. The unit will provide learners with an essential understanding of the changes that occur through growth and development of the craniofacial skeleton, and introduce them to the recognised theories of ageing and disease related to the oral cavity, associated tissues, structures and human dentition. Learners will study dental radiographs to identify oral anatomical landmarks and features to support the treatment planning process. This will link to consideration for planning, design and fabrication of dental prostheses, e.g. orthodontics, maxillofacial, fixed prosthodontics and prosthetic appliances.

These areas provide learners with essential links to all of the applied dental technology units within the qualification structure.

The final part of this unit will enable learners to identify structures and functions in different types of cells and tissues, and understand the structure and function of the nervous system and how we respond to changes in our internal and external environment; the structure and function of the endocrine system and homeostasis. Learners will develop an understanding of how human body systems are interlinked and therefore do not function in isolation.

## Learning outcomes

**On completion of this unit a learner should:**

1. Understand the human oro-facial structures and anatomical landmarks
2. Understand the bones and musculature of the craniofacial skeleton and oral cavity
3. Be able to model characteristics of human dentition
4. Understand the theories of growth, development, ageing and disease relating to the oral cavity, dentition and craniofacial structures
5. Understand the physiology of cells, tissues and human regulatory processes

## Unit content

**1 Understand the human oro-facial structures and anatomical landmarks**

*Anatomical landmarks*: sagittal plane; median plane; transverse plane; coronal plane; medial; lateral; anterior; posterior; mesial; distal; buccal; labial; proximal; superior; inferior

*Intra-oral landmarks*: mucosa; sulcus; tongue; frenal attachments; hard palate; soft palate; uvula; palatine tonsils; palatine fovea; palatal torus; rugae; alveolar ridges

*Extra-oral landmarks*: chin; lips; cheeks; nose; orbital ridge; eye; external auditory meatus

*Alveolar bone and tooth support*: alveolar bone structure (simple bone morphology); function; periodontal ligament; gingivae; bone cells (osteoclasts, osteoblasts, osteocytes)

*Nerve supply to the jaws*: trigeminal nerve (fifth cranial); mandibular division; maxillary division; appropriate branches of the facial nerve (seventh cranial); general nerve innovation to the oral cavity

*Blood supply to and from the oral cavity*: arterial supply (external and internal carotid, lingual, maxillary, facial); venous drainage (jugular, facial, pterygoid plexus, maxillary, anterior retro-mandibular)

*Lymph nodes*: (submental, submandibular, parotid, cervical); interconnection of lymph nodes

*Human saliva*: functions; main components; salivary glands (parotid, submandibular, sublingual); production and flow

**2 Understand the bones and musculature of the craniofacial skeleton and oral cavity**

*Bones of the cranium*: frontal; temporal; occipital; pariatal; ethmoid; sphenoid

*Bones of the facial skeleton*: maxillae; nasal; palatine; zygomatic; lacrymal; mandible (body, ramus, angle, coronoid process, sigmoid notch, condyle head, mylohyoid ridge, external oblique line); associated bone features (foramen, fossa, meatus, canal, condyle, process)

*Temporo mandibular joint*: condyle head; glenoid fossa; articular eminence; styloid process; capsule; synovial cavity; ligaments (temporo mandibular, stylo mandibular); main movements (hinge, lateral, protrusive, retrusive); centric position. TMJ Dysfunction causes and treatments.

*Muscles of mastication*: temporalis; masseter; medial pterygoid; latral pterygoid; mylohyoid; geniohyoid; digastric

*Muscles of expression*: orbicularis oris; zygomaticus major; zygomaticus minor; levator labii superioris; levator anguli oris; depressor anguli oris; depressor labii inferioris; levator labii inferioris; risorius; buccinator

*The tongue*: muscles (stylohyoid, hyoglossus, genioglossus, styloglossus, palatoglossus); changes in shape (swallowing, speech); features (taste buds, papillae); functions

*Muscles of the soft palate*: levator veli palatini; tensor veli palatini; palatoglossus; palatopharyngeus; uvula

**3 Be able to model the characteristics of human dentition**

*Structure of natural teeth*: development; eruption cycles and patterns (deciduous, permanent); number of teeth (deciduous, permanent); composition and form (enamel, dentine, pulp, cementum); function

*Natural and simulated occlusion*: relationship between the upper and lower occlusal surfaces (deciduous, permanent, mixed); interdigitation; articulation; masticatory efficiency; appreciation of tooth morphology in respect of conservation; prosthetic restorations by way of wax incremental techniques

*Range of human teeth*: characteristics (incisors, canines, premolars, molars); variations (shape, size, position, number of cusps); coronal features (pits, fossae, developmental grooves, disectional grooves, marginal ridges, mamelons); average tooth measurements

*External factors*: heredity; diet; environment

**4 Understand the theories of growth, development, ageing and disease relating to the oral cavity, dentition and craniofacial structures**

*Craniofacial growth*: craniofacial form; facial embryology; cranial growth; neurocranium; cranial base; mid facial development; mandible; nasal; factors affecting development

*Theories of ageing related to oral tissues*: epithelium; connective tissue; bone (maxillary, mandibular, alveolar); wound healing in the oral cavity

*Changes in the dentition*: freeway space; over eruption; tooth loss; drifting; methods employed to reduce occlusal interference; impact on patient; impact of dental technology

*Diseases and disorders*: impact on patient; normal and abnormal development; oral flora and fauna (candida albicans); the role of oral micro-organisms in the formation of plaque; caries; periodontal disease; potentially malignant conditions of the oral cavity and diseases such as hepatitis B and C and HIV that pose a cross-infection risk

**5 Understand the physiology of cells, tissues and human regulatory processes**

*Ultrastructure of an animal cell*: plasma membrane; cytoplasm; nucleus; nucleolus; endoplasmic reticulum; Golgi apparatus; vesicles; lysosomes; ribosomes; mitochondria; centrioles

*Tissue types*: epithelial (glandular, lining, covering), e.g. salivary glands of oral cavity, epithelial lining of the oral cavity; muscular, e.g. smooth muscle surrounding the gastrointestinal tract, skeletal muscle, intercostal muscles of the lungs, cardiac muscle of the heart; nervous, e.g. neurones and neuroglia; involuntary innervation throughout the body systems; connective, diverse group, cartilage, bone (e.g. ribs in respiratory system), areolar (within mucous membranes of the digestive system), adipose, elastic (fibres in artery walls within cardiovascular system), reticular, collagenous

*Levels of organisation*: through differentiation, cells form tissues; organs; organ systems

*Organisation and function of the nervous system*: central nervous system (main features of the brain and spinal cord); peripheral nervous system (afferent and efferent pathways); autonomic system (sympathetic and parasympathetic pathways); synaptic structure; structure of neurones, sense organs, effector organs; sensory (afferent) and motor (efferent) neurones; somatic and autonomic (sympathetic and parasympathetic) neurons

*Organisation and function of the endocrine system*: pituitary gland; hypothalamus; thyroid and parathyroid gland; pancreas; adrenal medulla; adrenal cortex; gonads and placenta; pineal; gastrointestinal tract; characteristics of hormones; names and actions of principal hormones produced by each gland; hormone responses to extremes of stress and alarm, e.g. fight and flight

*Principles of homeostasis*: definition of homeostasis; principles of homeostatic control systems; significance of maintaining an optimum internal environment for cell function

*Homeostatic systems*: endocrine control and feedback in general; regulation of blood glucose (insulin, glucagon, adrenaline, glucocorticoids); regulation of body fluids and temperature

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 assess the function of the intra-oral landmarks of the face and surrounding area, using appropriate anatomical terminology [IE1] | M1 assess the importance of the intra-oral landmarks, face and surrounding structures, with regards to design criteria for custom-made dental devices | D1 evaluate the effects on oral tissue of devices that do not consider the effects of facial structures in their design |
| P2 summarise the periodontal structures and neurovascular supply of the maxilla and mandible [IE1] | M2 discuss how the teeth are supported within the alveolar bone, emphasising the function of the neurovascular supply to the teeth | |
| P3 explain the relationship between the location and function of the salivary glands and major lymph nodes in the face and neck [IE1] | M3 discuss how the salivary system maintains a healthy oral environment, emphasising the effects of reduced saliva flow | |
| P4 explain the relationship of the bones of the cranium and facial skeleton to their function [IE1] | M4 assess the function and movements of the temporo mandibular joint during speech, mastication and swallowing, including how these movements are limited and controlled | D2 discuss TMJ Dysfunction, its causes and treatments |
| P5 explain the function of the bones of the middle and lower facial thirds in relation to their location | | |

| Assessment and grading criteria | | |
|---|---|---|
| P6 describe the origin, insertion and function of the muscles of mastication and facial expression, the tongue and soft palate | M5 discuss the effects of changes in shape and position of the tongue, soft palate and lips, during speech, mastication and swallowing | |
| P7 explain the muscles of the facial skeleton and oral cavity in relation to their function | | |
| P8 explain the stages in the eruption cycles and development of deciduous and permanent teeth | M6 discuss the major changes that take place in human dentition throughout life, indicating what the likely effects of these could be | |
| P9 produce examples of posterior tooth form and occlusion using a recognised wax incremental technique [RL4] | M7 compare natural tooth forms, features and occlusal relationship | D3 evaluate the fitness for purpose of the various forms of simulated natural dentitions used in dental technology [RL5] |
| P10 explain how the face changes during growth, development and ageing [CT1] | M8 assess the facial changes associated with growth, development and age, and how external factors can influence these changes | |
| P11 explain how oral disease can be related to the common forms of oral flora, fauna and micro-organisms [CT1] | M9 examine the causes and formation of dental caries, including the effect of caries on the dentition | D4 discuss the common diseases of the oral mucosa, including potentially malignant conditions |
| P12 explain the relationship between the organisation of the eukaryotic cell and the functions of its organelles [IE1] | M10 discuss how the relative presence of different cell components influences the function of tissues | |



| Assessment and grading criteria | | |
|---|---|---|
| P13 explain the relationship between cells, tissues, organs and organ systems in the organisation of the human body | | |
| P14 describe the four different tissue types | M11 compare and contrast the four tissue types | D5 analyse the relationship between the tissue types that are found within the oral cavity and surrounding musculature and their function |
| P15 explain the relationship between the structure of the nervous system and its function | M12 discuss the interrelationship between the nervous and endocrine systems | |
| P16 explain the relationship between the structure of the endocrine system and its function | | |
| P17 explain the mechanisms of the homeostatic system | M13 discuss positive and negative feedback in homeostasis using examples from the human body | |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

This unit should be delivered using a wide range of delivery methods and media, including lectures, discussion, ICT research and clinical observations where possible. The use of natural and artificial skulls and human teeth is invaluable. Assessment will predominantly be assignment based, and viva voce where appropriate.

## Delivery

This unit is designed to give learners a general level of knowledge and understanding of the anatomical structures, tissues and functions of the human head, mainly focusing on the oral cavity, dentition and associated structures and tissues.

A fundamental understanding of oral and facial anatomical structures and features should form an essential foundation for all applied dental technology units; therefore, this unit should be delivered before or with such units.

Tutors delivering this unit should consider integrating the delivery, private study and assessment relating to this unit with other relevant units that form part of the programme of study as stated in the unit content.

A wide range of delivery methods and media, such as lectures, question and answer sessions, discussion, video, and research using CD ROM, the internet and library resources, should stimulate and motivate learners. It is recognised that some degree of clinical observation would be invaluable although not always practicable, in which case the use of phantom heads, natural and artificial skulls and human teeth would also be useful learning resources.

Learning outcomes 1 and 2 are closely linked; they are intended to provide learners with a general overview of the anatomical structures and associated tissues of the human head, focusing to a great extent on the oral cavity, bones of the skull and musculature. Delivery techniques and media should be varied. It is suggested that learners observe their own oral structures as a natural resource, supplemented by clinical observation when practicable. They should have access to a range of human skulls (natural or artificial) to realise a three-dimensional experience of the oro-facial anatomy. Ideally a range of other anatomical models and high quality audio-visual materials should be available to describe and illustrate anatomical structures and tissues that cannot be visualised by other means.

Learning outcome 3 can be delivered through formal lectures, practical demonstrations, set formative exercises and self-supported learning, particularly for wax incremental techniques. Learners should have access to a range of natural and artificial skulls together with various examples of natural and simulated human teeth.

Learning outcome 4 is likely to be delivered through formal lectures, audio-visual materials and discussion. Learners should be encouraged to undertake individual and group research activities in order to meet the performance criteria. Visiting expert speakers would add to the relevance of the subject for learners. For example, a dental hygienist could talk about the diseases and disorders of the oral cavity.

For learning outcome 5 a combination of approaches should be employed, including formal lectures, investigation by learners through a variety of sources and practical work. By the end of this outcome learners should understand cell structure, the levels of organisation in the whole body, how the body systems function and are regulated. Where appropriate examples should be given which relate to the oral cavity, oropharynx and surrounding associated tissue.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Understand the human oro-facial structures and anatomical landmarks* | |
| Introduction to the intra-oral and extra-oral landmarks of the face and surrounding area | 6 |
| Learners to produce diagrams and supporting written work to describe the location and function of human oro-facial structures and associated anatomical landmarks | 7 |
| Description, illustration and explanation of the relationship between the neurovascular, lymphatic and salivary systems | 6 |
| **Assignment 1: Anatomical, intra-oral and extra-oral landmarks** (P1, M1, D1)<br>**Assignment 2: Location and function of human oro-facial structures** (P2, P3, M2, M3) | 8<br>10 |
| **Learning outcome 2** | |
| *Understand the bones and musculature of the craniofacial skeleton and oral cavity* | |
| Produce detailed labelled diagrams of the bones of the cranium and facial skeleton supported by written explanations of these structures | 6 |
| Produce detailed labelled diagrams and explain the musculature of the head, face and oral cavity | 6 |
| Discuss the relationship, location and function of the bones and muscles of the head and neck | 7 |
| **Assignment 3: Bones and muscles of the facial skeleton and oral cavity** (P4, P5, P6, P7, M4, M5, D2) | 10 |
| **Learning outcome 3** | |
| *Be able to model characteristics of human dentition* | |
| Introduction and discussion regarding growth patterns and development of human dentition | 6 |
| Production of illustrations, form and characteristics of human dentition | 6 |
| Learners to produce occlusal simulation by an incremental wax additive technique or a CAD design suite | 8 |
| **Assignment 4: The human dentition, its growth, development and form** (P8, P9, M6, M7, D3) | 8 |
| **Learning outcome 4** | |
| *Understand the theories of growth, development, ageing and disease relating to the oral cavity, dentition and craniofacial structures* | |
| Introduction to the theories of growth, development and ageing | 6 |
| Learners to research the flora and fauna of the oral cavity and oral diseases | 6 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Assignment 5: Theories of craniofacial growth, development and ageing** (P10, M8)<br>**Assignment 6: Flora, fauna and diseases of the oral cavity** (P11, M9, D4) | 8<br>8 |
| **Learning outcome 5** | |
| *Understand the physiology of cells, tissues and human regulatory processes* | |
| Introduction to cells and tissues of the oral cavity and related areas | 6 |
| The organisation of the human body systems and the regulation of bodily processes | 6 |
| **Assignment 7: Levels of organisation of the human body** (P12, P13, P14, M10, M11, D5)<br>**Assignment 8: Regulation of human body systems** (P15, P16, P17, M12, M13) | 8<br>8 |
| **Total learning time hours** | **150** |

## Assessment

Most of the evidence for this unit will be generated from a series of assignments designed to encompass the documented grading criteria for each of the five learning outcomes. Further evidence will be generated and documented by viva voce where appropriate. It is suggested that **one** assignment is designed to cover **one** learning outcome: the material for these assignments will be gained by formal study, and from information researched and collated during private study. Assignments can be stand-alone or integrated with the content of other units that form links within the general framework of study.

Care should be taken with integrated assignments to ensure that learners meet the assessment criteria for each unit and record this appropriately.

To achieve a **pass** grade, learners must achieve **all 17** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the pass criteria **plus all 13** merit criteria as documented in the grading grid.

To achieve a **distinction** grade, learners must achieve all pass and merit grade criteria and **all five** distinction criteria.

P1 requires learners to assess the function of numerous intra-oral and facial landmarks as indicated by the unit tutor, using appropriate anatomical terminology. This could be assessed by learners producing accurate annotated diagrams of the oral cavity and face.

P2 requires learners to summarise the alveolar and periodontal tooth supporting structures of the maxilla and mandible together with their associated blood and nerve supply. This should be assessed by the labelling of anatomical cross-sectional diagrams of the head and supporting descriptions, viva voce, or a combination of the two, and formally recorded by the tutor.

P3 requires learners to explain the relationship between the salivary glands and major lymph nodes, from studying cross-sectional diagrams of the human head and neck. This should be assessed and recorded by the unit tutor.

P4 requires learners to explain the bones of the human skull, their position and relationship to each other and function. This can be assessed by viva voce using natural or simulated human skulls, and recorded by the unit tutor; or by illustration and labelling and supporting elaboration; or by written test.

For P5, learners must explain the function of the bones of the middle and lower facial thirds. This can be assessed as per P4.

For P6, learners must describe the origin, insertion and function of the muscles of mastication, facial expression, the tongue and soft palate. This could take the form of a table or chart indicating the name of the muscle, its origin, insertion and function, in four columns.

For P7, the function of the muscles covered in P6 should be explained. This could be assessed by presentation, written work or test in conjunction with P6.

For P8, learners must explain the stages of tooth eruption and continued development of both the deciduous and permanent dentitions. This could be assessed through a written report.

For P9, learners must demonstrate an appreciation and understanding of natural tooth form, features and occlusal relationship. This can be assessed and documented by a combination of viva voce and the production of a series of 3D tooth forms to simulate natural tooth shape, using a recognised wax incremental technique or CAD.

P10 requires learners to explain the normal and abnormal changes in face shape in relation to growth, development and ageing. The assessment can be by written account or by viva voce.

For P11, learners are required to explain how oral diseases can be related to the common forms of flora, fauna and micro-organisms that are to be found in the oral cavity. This could be presented as a poster or pamphlet.

For P12, learners must explain the relationship between the organisation of a eukaryote cell and the functions of its organelles. This could take the form of a flow chart illustrating the concept, with attached notes explaining the relationship.

P13 requires learners to explain the relationship between cells, tissues, organs and organ systems. Assessment could be through a written report identifying major body systems and then breaking them down into the constituent cells, tissues and organs.

For P14, learners must describe the four different tissue types of the human body. An academic poster presentation may be used for this.

For P15, it is not sufficient for learners to list the functions of the nervous system; the emphasis here is on considering the functions in terms of nerve impulses. A clear but succinct description is required, showing how nerve impulses are part of a control system in the body.

For P16, learners need to give a clear explanation, through diagrams and descriptions, of how the endocrine system is organised, relating this organisation to its functions to bring about changes in the body.

For P17, learners must give a clear explanation of the main systems involved in homeostasis and how they work. Learners must demonstrate through the clarity of their account, whether pictorial or descriptive, that they understand it is a regulatory system essential for the maintenance of a steady state in the body.

M1 requires learners to assess the importance of the intra-oral landmarks, face and surrounding areas, identified in P1, using appropriate anatomical terminology. This could take the form of a glossary of terms, with each term followed by an explanation and definition. The glossary could be produced as a ready reference guide for other users.

For M2, learners must discuss how the alveolar, periodontal and gingival tissues, identified in P2, support the teeth within the alveolar bone, and how the vitality of these structures is maintained by the functions of the associated neurovascular systems.

For M3, learners must discuss how the functions of the salivary glands and major lymph nodes of the face and neck and this system maintains a healthy oral environment, emphasising the effects of reduced saliva flow.

To achieve M4, learners should assess the function and movements of the TMJ during different jaw actions, such as mastication and speech, explaining how these actions are limited and controlled by the surrounding tissues.

M5 requires learners to discuss the effects of the actions of the tongue, soft palate and lips. Learners must reference the actions of the various muscle groups and how each group of muscles affects the function, shape and position of the tongue, soft palate and lip during speech, mastication and swallowing.

For M6, learners need to adapt and expand the evidence documented in P8 to discuss the major changes that take place in human dentition throughout life, and detail the potential effects of these changes on the individual.

M7 requires learners to compare natural tooth forms, features and occlusal relationship. Learners could produce a reference booklet, which could be used by others, describing and illustrating the shape and features of the deciduous and permanent human dentitions, and describing their occlusal interdigitation.

For M8, learners must assess the changes taking place in facial shape throughout life either naturally or due to external influences. This could be by producing a series of visuals to accompany the explanation. The form of the visuals is non-specific, but it is important that they are proportionally accurate.

For M9, learners are required to examine the causes and formation of dental caries and the effect of caries on the dentition.

To achieve M10, learners must discuss how the function of cells is influenced by the type and number of organelles found within them related to tissue type.

For M11, learners must compare and contrast the structure of the four tissue types, for example through a presentation illustrating the process of differentiation and how this may influence the organelles or structure of the cells.

For M12, learners must discuss the interrelationship between the nervous and endocrine systems to explain how the systems work together. Flow diagrams are a good way of demonstrating this.

For M13, learners must discuss positive and negative homeostatic feedback mechanisms. Annotated diagrams are an ideal way of presenting some of this material.

For D1, learners must evaluate the effects on oral tissue of devices that do not consider facial structure in their design. This could be presented in a written report.

For D2, learners must discuss TMJ Dysfunction, considering the symptoms and the variety of causes, with comparisons to other forms of facial pain. This could be presented in a written report.

D3 requires learners to evaluate the fitness for purpose of various forms of simulated natural dentitions available for use in dental technology. Learners must evaluate their findings, taking into consideration such things as cost, time saving ability, similarity to natural form and functional ability. This could be presented in a written report.

For D4, learners are required to discuss the common diseases of the oral mucosa, including potentially malignant conditions. Learners could link evidence for P11, M9 and D4 in the form of a booklet entitled ’Diseases and disorders of the oral cavity’

To achieve D5, learners must analyse the relationship between the tissue types that are found within the oral cavity and surrounding musculature and their function. This can be linked to P14 and M11.

## Programme of suggested assignments

The table below shows a *Programme of suggested assignments* that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, M1, D1 | Anatomical, intra-oral and extra-oral landmarks | You have been asked to help produce an illustrated reference booklet that can be used by other learners, to identify anatomical structures relevant to the design of custom-made dental devices. | • Anatomically correct labelled diagrams<br>• Glossary of descriptions and definitions<br>• Written report |
| P2, P3, M2, M3 | Location and function of human oro-facial structures | A friend of the family, who teaches at the local secondary school, has asked if you could produce diagrams of the human skull, with a series of overlays depicting: the periodontal structures; the neurovascular system of the maxilla and mandible; the salivary glands; and the lymphatic system. | • Viva voce<br>• Anatomically correct labelled diagrams<br>• Identification and recording charts<br>• Written report<br>• Test |
| P4, P5, P6, P7, M4, M5, D2 | Bones and muscles of the facial skeleton and oral cavity | A local college has asked you to produce interactive diagrams of the human skull, with a series of overlaying muscle structures complete with explanations, to use as a teaching aid. | • Viva voce<br>• Anatomically correct labelled diagrams<br>• Tables and charts<br>• Written account<br>• Identification and recording |
| P8, P9, M6, M7, D3 | The human dentition, its growth, development and form | The owner of ABC dental laboratory has asked you to produce a reference booklet explaining and illustrating the shape and features of the deciduous and permanent human dentitions. He has also asked you to produce a series of wax occlusal carvings to be used as a visual aid for his apprentice technicians. | • Viva voce<br>• Written account<br>• Learner reference booklet<br>• Occlusal wax carvings<br>• Written evaluation |

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P10, M8 | Theories of craniofacial growth, development and ageing | You have been asked to produce an ICT presentation and accompanying notes to illustrate and explain the theories of craniofacial growth, development and ageing. | • Viva voce<br>• Written account<br>• Visual presentation<br>• Written report |
| P11, M9, D4 | Flora, fauna and diseases of the oral cavity | You have been asked to produce a reference booklet of colour photographs of the flora, fauna and common diseases of the oral cavity to be used by a class of dental nurses. | • Written account<br>• Written report |
| P12, P13, P14, M10, M11, D5 | Levels of organisation of the human body | You have been asked to produce a technical booklet to educate trainee technicians, and broaden their understanding of cells and tissue. | • Annotated leaflet illustrating different levels of organisation |
| P15, P16, P17, M12, M13 | Regulation of human body systems | A paper is to be presented to a dental conference discussing the physiology of body systems and their impact on dental treatments. | • Viva voce<br>• Written account<br>• Visual presentation<br>• Written report |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 6: Dental Public Health and Preventative Dentistry |
| Unit 7: Removable Complete Prosthodontics |
| Unit 8: Removable Partial Prosthodontics |
| Unit 10: Design of Fixed Prosthodontics |
| Unit 13: Orthodontic Therapy Principles |

## Essential resources

This unit requires specialist lecturers, who can, where appropriate, link the theoretical aspects to the production of custom-made dental devices and associated practical techniques, such as wax incremental techniques. This will require access to a dental laboratory. A range of specialist visual aids of the head and oral cavity will be needed, including natural and simulated human skulls, natural and simulated human teeth and other appropriate anatomical models. Adequate library resources should be available with access to ICT facilities, the internet and a range of appropriate journals.

## Employer engagement and vocational contexts

Dental anatomy forms the basis of all dental technology techniques with regards to function and clinical suitability in the design and manufacture of custom-made dental devices. Where possible, learners should visit clinical and hospital departments, or have visiting specialist lecturers from such establishments. Where this is not possible, learners should be provided with appropriate case study materials and simulation.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are... |
|---|---|
| Independent enquirers | [IE1] Identifying the position and relationship of the bones of the cranium and facial skeleton; labelling diagrams identifying the periodontal structures and neurovascular supply of the maxilla and mandible |
| Creative thinkers | [CT1] Identifying in visual format the major changes in face shape related to growth, development and age |
| Reflective learners | [RL4] Producing examples of posterior tooth form and occlusion using a recognised wax incremental technique |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are... |
|---|---|
| Creative thinkers | [CT4] Questioning the assumptions as to how external factors can influence facial changes associated with growth, development and age |
| Reflective learners | [RL5] Evaluating the various forms of simulated natural dentitions used in dental technology |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Internet searches; entering data; word-processing documents to meet the requirements of assignments |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Producing a plan of tasks to be undertaken, reflecting on how the assignment is progressing |
| Manage information storage to enable efficient retrieval | Saving information in suitable files in suitable folders |
| Follow and understand the need for safety and security practices | Keeping food and drink away from computers; not using someone else's login; explaining how safety is addressed in the context of the tasks; explaining why the IT usage policy forbids certain actions |
| Troubleshoot | Carrying out checks to identify the source of a problem encountered, e.g. missing file of work |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Using suitable data from the internet, books, data supplied by the tutor and associated specialist lecturers |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Searching for data; selecting appropriate data; evaluating whether it meets the requirements of the assignment task |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Ensuring all necessary information for the unit is available electronically:<br>• Flow charts of neurovascular systems<br>• Digital images of natural and simulated anatomical structures |
| Bring together information to suit content and purpose | Collecting information in one file for editing into a suitable format |
| Present information in ways that are fit for purpose and audience | Presenting information in the formats required in the assignment briefs |

| Skill | When learners are… |
|---|---|
| Evaluate the selection and use of ICT tools and facilities used to present information | Evaluating whether the presentation of data is appropriate in terms of the grading criteria |
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Communicating with tutors and peers electronically; storing materials relevant to the assignment; responding to tutor feedback |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | Analysing cephalometric radiographs for osteotomy planning |
| Identify the situation or problem and the mathematical methods needed to tackle it | Using calculations to calculate jaw relationships when using cephalometric analysis |
| Select and apply a range of skills to find solutions | Using calculations related to x-ray distortion when planning implant cases |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | Using measured angles from cephalometrics to calculate jaw relationships and apply these results to treatment planning |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Participating in class discussions and Q&A sessions; asking pertinent questions |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading, retrieving and selecting appropriate text; understanding anatomical terminology relevant to the assignment |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing reports and assignments |

# Unit 4: Basic Dental Materials Science

**Unit reference number:** D/505/9561

**Level:** 3

**Credit value:** 10

**Guided learning hours:** 77

## Unit Aim

An individual entering into the dental laboratory environment will need to develop an awareness and understanding of the uses and limitations of dental technology materials commonly used during the construction of dental devices to a set clinical prescription.

## Unit introduction

This unit is an introduction to the science of common dental materials and learners are encouraged to explore the uses and limitations of these materials using the knowledge gained. There is the opportunity within the unit to build on the underpinning knowledge and understanding of the safe handling of dental materials in order to achieve optimum and consistent results for the construction of various dental devices. This will provide a link to enhance the areas covered in *Unit 1: Dental Technology Fundamentals*.

## Learning outcomes

**On completion of this unit a learner should:**

1. Understand fundamental scientific principles essential to dental technology
2. Understand how to select and utilise a range of dental waxes
3. Understand the selection criteria for use of gypsum and synthetic stone materials in dental technology
4. Understand the uses of different polymeric materials in dental technology

## Unit content

### 1 Understand fundamental scientific principles essential to dental technology

*The periodic table:* organisation of elements that are used as constituents of dental materials including metals and non-metals used to form dental alloys, ceramics composites, acrylics and dental plaster; periodicity; groups (physical and chemical properties); relative atomic mass; atomic number; use of the periodic table to select dental materials

*Electronic structure of atoms:* Bohr's theory used to categorise dental materials, Lewis diagrams to show bonding within dental alloys, ceramics and gypsum products

*Bonding of elements:* ionic bonding; covalent bonding; relationship of bonding properties exhibited by dental materials, dental alloys; dental polymeric materials

*Ideal properties*: dental materials and biomaterials

*Chemical properties:* hydrophilic and hydrophobic; molecules; ions; electro negativity; dipoles; hydrogen bonds; van der Waals forces; intermolecular; intramolecular; oxidisation; reactivity; chemical erosion; galvanic cell; corrosion; tarnishing; dissimilar metals present in the oral environment

*Quantities in chemical reactions:* formulae; balanced equations

*Substances:* inorganic and organic substances; solids; liquids; gases

*Physical properties:* viscosity of dental materials and the effects of good and poor wetting; thixotropy; elasticity of dental polymers and dental alloys; electrical conductivity, thermal conductivity of dental materials, thermal diffusion in dental alloys and other materials; thermal expansion of materials used in the oral environment; appearance; malleability, ductility, surface texture to include dental alloys, ceramics and polymers; polished and etched surfaces

*Mechanical properties:* requirements of dental biomaterials, tensile and compressive properties applied to dental alloys, ceramics, composites and acrylics, e.g. stress/strain, yield, elastic and plastic deformation, Young's modulus applied to dental alloys and ceramics; use of load/extension curve to record test results and illustrate behaviour; hardness, e.g. Vickers, Brinell, Rockwell used to determine the surface hardness of alloys, ceramics and other dental materials, Rebound; further property definitions, e.g. toughness/impact, fatigue strength, creep strength of dental ceramics or alloys; testing of materials including gypsum

*Biological properties:* biomaterials; biocompatibility; importance of this type of property when employed in the oral environment; metal ratios in dental alloys and the effects on biocompatibility; host reaction, non-toxic, non-irritant; allergenic properties of dental alloys and polymeric materials; principles of osseointegration; carcinogenic potential

### 2 Understand how to select and utilise a range of dental waxes

*Properties of dental waxes*: melting points; storage; colours; ideal properties; limitations

*Structure*: compositions; natural/synthetic; grading; stability; effects of residue on process; storage and handling

*Range of dental waxes*: modelling wax; sticky wax; inlay wax; tooth carving wax; carding wax

**3 Understand the selection criteria for use of gypsum and synthetic stone materials in dental technology**

*Properties of gypsum materials:* types; variations and manufacturing processes; selection; ideal properties; mechanical properties; selection; safe storage; handling and disposal

*Uses:* safe handling techniques; vacuum mixing; mixing ratios and effects on properties; defects; synthetic stone materials; relating the use of gypsum materials for the differing disciplines within dental technology processes; handling techniques and effects on gypsum materials; safe handling guidelines and practice; storage and disposal

*Risks:* physical issues using gypsum materials; health and safety implications; management of equipment maintenance and records; impact on the environment

*Issues:* ethical disposal of gypsum based dental materials

**4 Understand the uses of different polymeric materials in dental technology**

*Science of polymers*: basic polymer science

*Terminology and definitions*: natural, synthetic, monomer; polymer; co-polymer, composites; polymerisation; elasticity; plasticity polymerisation; structure of polymers; basic molecular chain and three-dimensional structures

*Classification of dental polymers*: thermoplastic; thermoset; elastomer; bioplastic; standard abbreviation in each classification

*Properties of polymeric materials:* requirements; ideal properties; limitations; selection and manipulation; safe storage; handling and disposal

*Mechanical properties:* tensile strength; hardness; impact strength; density

*Biological properties*: reaction of hard and soft oral tissues to the introduction of a dental polymeric material; effects of polymethyl methacrylate

*Physical properties*: cost of materials; aesthetic properties; surface finish; manufacturing faults

*Function of additives:* fillers; plasticisers; cross-linking agents; impact modifiers; antioxidants; stabilisers; blowing agents

*Materials:* thermo forming plastics; denture base and repair resins; denture teeth polymers; curing techniques and cycles; heat cure; cold cure and autopolymerising; milling

*Uses of polymeric materials in dental technology:* denture base materials; denture teeth; orthodontic resins; models

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 explain how elements used in dental materials can be categorised using the periodic table, including electronic structure and bonding [IE1, SM2,3] | M1 discuss how a dental technician can use the periodic table to assist in the determination of properties for dental materials used in the fabrication of dental appliances | |
| P2 explain the importance of the chemical, biological, and mechanical properties in the selection of materials used in dental technology | M2 discuss the key points relating to chemical, biological, physical and mechanical properties of dental materials | D1 analyse the properties of a range of dental biomaterials, justifying their selection |
| P3 explain the use of dental waxes found within the dental laboratory | M3 review the properties of dental waxes | D2 evaluate waxes used in the dental laboratory |
| P4 explain the selection criteria applied to assess the suitability of using either gypsum or synthetic stone materials in the dental laboratory [IE1] | M4 discuss the use of gypsum and synthetic stone materials used in the dental laboratory | D3 critically evaluate gypsum and synthetic stone materials used in the dental laboratory |
| P5 explain the use of effective safety protocols employed when working with dental biomaterials | M5 justify the relevance of current guidelines on the safe handling of dental biomaterials during the construction phases | |

| Assessment and grading criteria | | |
|---|---|---|
| P6 explain the structure and properties of different categories of polymers | M6 justify the use of different polymeric materials in the dental laboratory based on their properties | D4 evaluate the use of different types of polymeric materials within the dental laboratory environment |
| P7 explain the uses of different polymeric materials in dental technology | | |
| P8 assess the role of the common constituents found in dental polymeric materials | | |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

Delivery should be carried out in a dental laboratory as there may be opportunities for practical experimentation in this unit. Formal lectures and group activities would enhance teaching.
The assessment evidence suggests the use of different formats to encourage applied learning, including group work, tests, assignments, presentations and case studies.

## Delivery

Delivery should incorporate a range of relevant techniques that draw on a variety of resources to introduce learners to scientific principles relating to dental technology and to common dental materials. Lectures, discussions, seminar presentations, practical evaluations, research using the internet and/or library resources would all be suitable. Site visits to dental companies, science laboratories, supervised practical activities using dental technology techniques related to the materials covered in the learning outcomes and the use of personal and/or relevant dental laboratory experience would enhance learners' understanding of basic dental biomaterials. Activities from other units in this programme can be linked to the dental materials unit.

Regular monitoring of work placements to ensure the quality of the learning experience should be encouraged and is an integral part of *Unit 16: Work-based Learning in Dental Technology*. Dental laboratory owners, managers and supervisors should be made aware of the requirements of this unit prior to any work-related activities to link dental laboratory techniques with the dental materials currently used. For example, learners may have the opportunity to record the different types of dental gypsum materials used to construct models from impressions received from the dental surgery following direct instruction from a prescription. Consideration should be given to the sharing of individual research through a group/class approach and using presentations, group seminars, practical demonstrations, hand-outs and discussions. This will encourage a broader dissemination of knowledge.

Whichever delivery methods are used, it is essential that tutors stress the importance of health and safety when handling dental materials and are aware of the current COSHH regulations.

Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may also be taking as part of the programme of study.

Learning outcome 1 focuses on the underpinning scientific principles of dental technology and properties of materials used in dentistry. A good understanding of these principles will assist the learner in making informed choices when selecting dental materials. It is expected that formal lectures, demonstrations and supervised practical activities linking to other relevant units in the programme will form part of the delivery of this outcome.

Learning outcome 2 develops a basic understanding of the properties of dental waxes currently used by the dental technician. Formal lectures, demonstrations and supervised practicals linking to other relevant units in the programme should form part of the delivery of this outcome.

Learning outcome 3 is likely to be delivered through formal lectures, discussions and independent learner research. The use of practical activities related to model-making materials and separating media linking to *Unit 1: Dental Technology Fundamentals* would help learners appreciate the demands made on the dental materials in normal use and their correct selection for the range of dental technology disciplines. Data sheets and hazard cards from companies supplying the materials would be useful in addressing health and safety issues.

Learning outcome 4 focuses on the underpinning scientific principles and properties of polymers used in dentistry. Selection and techniques used to process these materials following a prescription is an integral part of this learning outcome. It is expected that formal lectures, demonstrations and supervised practical activities linking to other relevant units in the programme will form part of the delivery of this outcome. Data sheets and hazard cards from companies supplying the materials would be useful in addressing health and safety issues.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Understand fundamental scientific principles essential to dental technology* | |
| Introduction to unit – concept of looking at theory and then related practical work. Tutor introduction to a review of the periodic table, atomic structure and bonding using computer software or worksheets | 2 |
| The mole in chemistry, calculating quantities | 1 |
| Formal teaching followed by practice exercises<br>Structure and properties of elements used in dental materials and their compounds and relation to the periodic table | 2 |
| SPD notation and structure of the periodic table<br>Relation of ionisation energies, atomic radius, electron affinity, electronegativity to position in the periodic table – constructing charts and identifying and describing trends | 2 |
| Formal lectures on the properties of materials including biological, physical, chemical and mechanical | 2 |
| Investigating chemical properties – metals, non-metals, metalloids; bonding in; metal reactivity series; investigation of reactions with air, water, acid; metal displacement reactions. This can be facilitated by practical exercises and tests | 2 |
| Investigating physical properties – viscosity; thixotropy; elasticity; electrical conductivity, thermal conductivity, thermal diffusion; thermal expansion; appearance; malleability, ductility, surface texture | 2 |
| Investigating mechanical properties – tensile and compressive properties, e.g. stress/strain, yield, elastic and plastic deformation, Young's modulus; use of load/extension curve to record test results and illustrate behaviour; hardness, e.g. Vickers, Brinell, Rockwell, Rebound; further property definitions, e.g. toughness/impact, fatigue strength, creep strength. Delivered as a series of lectures with practical exercises to include material testing | 3 |
| Formal lecture introducing biological property terms – biomaterials, biocompatibility. Effects of dental materials in the oral environment | 1 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Assignment 1: Electronic arrangement, the periodic table and dental material properties** (P1, P2, M1, M2, D1) | 6 |
| **Learning outcome 2** | |
| *Understand how to select and utilise a range of dental waxes* | |
| Introduction to the properties and uses of dental waxes | 2 |
| Introduce the variety of waxes that can be used in the production of dental appliances | 3 |
| Discuss the basic properties, application and history of dental waxes | 3 |
| Demonstrate the uses of a range of waxes | 2 |
| Discuss the composition of natural and synthetic waxes and how they affect the properties of the material | 2 |
| Present the classification of dental waxes | 1 |
| Discuss the ideal properties of dental waxes | 1 |
| Personal study time and research | 2 |
| **Assignment 2: Properties and uses of dental waxes** (P3, M3, D2) | 6 |
| **Learning outcome 3** | |
| *Understand the selection criteria for use of gypsum and synthetic stone materials in dental technology* | |
| Introduction to gypsum products and synthetic stone utilised in the dental laboratory | 1 |
| Discuss the sourcing and manufacturing processes used to form dental modelling materials | 1 |
| Discuss processing techniques for gypsum materials and synthetic stone materials | 1 |
| Discuss practical testing procedures and equipment management<br>Carry out test procedures | 5 |
| Finalise test procedures and start to organise structure for technical report and presentation | 1 |
| Introduce students to the structure of an academic technical report<br>Discuss the ideal properties of gypsum-based materials and synthetic stone | 1<br>3 |
| Review the main uses of gypsum materials and synthetic stone and the ideal properties of model materials<br>Discuss the composition of dental modelling materials | 2<br>1 |
| Demonstrate manipulation techniques used to process dental modelling materials | 3 |
| Group presentations | 2 |
| Demonstrate the handling techniques and effects on model materials | 2 |
| Discuss safe handling, storage and disposal of model materials | 2 |
| **Assignment 3: Gypsum products and synthetic stone utilised in the dental laboratory** (P4, P5, M4, M5, D3) | 5 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 4** | |
| *Understand the uses of different polymeric materials in dental technology* | |
| Introduce the variety of polymeric dental materials | 1 |
| Discuss simple polymer science and types of polymerisation | 2 |
| Discuss uses of polymeric materials in the production of dental appliances | 2 |
| Examine the ideal requirements for a permanent polymeric material | 1 |
| Discuss the requirements of ideal materials to function as a restorative material | 1 |
| Introduce the ideal properties for polymeric materials | 1 |
| Review the function and action of constituents present in polymeric materials | 2 |
| Research the health and safety and environmental aspects necessary to use these materials in a safe manner | 2 |
| Demonstrate different forming and curing systems | 3 |
| Analyse a range of available polymeric systems to determine the most cost efficient system and the system that returns reliable appliances | 2 |
| Demonstrate different finishing and polishing techniques for polymeric materials | 2 |
| Demonstrate quality control processes for a range of polymeric materials and appliances | 1 |
| **Assignment 4: Properties and uses of a range of polymeric dental materials** (P6, P7, P8, M6, D4) | 5 |
| **Total learning time hours** | **100** |

## Assessment

To achieve a **pass** grade, learners must achieve **all eight** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all six** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all four** distinction criteria as outlined in the grading grid.

To achieve P1, learners must explain how elements used in dental materials can be categorised using the periodic table, including electronic structure and bonding. This can be assessed by the tutor using assignments and class tests on content such as the location of elements in the table and the properties they will exhibit.

P2 requires learners to explain the importance of material properties including chemical, biological and mechanical when selecting dental materials. This criterion can be evidenced in a formal written report.

P3 requires learners to explain the use of dental waxes found within the dental laboratory. Learners will be expected to state the main types of dental waxes available to the dental technician. This could be assessed by the tutor during practical activities, with evidence in the form of observation records completed by learners and the tutor. Alternatively, learners could provide evidence in the form of a presentation using ICT.

P4 requires learners to explain the selection criteria used to assess the suitability of the main forms of gypsum and synthetic stone materials used in the dental laboratory. Learners will be expected to cover the range of uses and properties listed in the unit content. This criterion could be assessed directly by the tutor during practical activities or by learners completing a practical research project to provide evidence for a technical report. Suitable evidence for the former would be observation records completed by learners and the tutor.

For P5, learners must explain the use of effective safety protocols when working with dental biomaterials. This is to include risk management when handling the material and any guidelines on using specialist dental laboratory equipment, completion of maintenance records and storage of equipment. This can be assessed in the form of a practical observation.

For P6, learners will be expected to explain the structure and properties of different categories of polymeric materials used for various purposes within the dental laboratory. They will be expected to cover the range of underlying principles listed in the unit content. Evidence for this could take the form of a presentation and a poster highlighting the outcomes.

For P7, learners must explain the uses of different polymeric materials in dental technology to include removable and fixed prosthodontics. Evidence for this element of the grading criteria can be included with evidence for P8.

For P8, learners must assess the role and function of common constituents found in dental polymeric materials. Evidence for this criterion can include a written report.

For M1, learners must discuss how a dental technician can use the periodic table to assist in the determination of properties for dental materials used in the fabrication of dental appliances. This criterion can be evidenced in a formal report.

For M2, learners are required to discuss the key points relating to each category of properties of common materials used in dental technology. Evidence may be in the same format as for P2.

For M3, learners must review the properties of dental waxes and compare with ideal requirements. They will be expected to make comparisons with generally accepted ideal requirements and in doing so explain the properties and structure of a range of dental waxes. The evidence presented must be broad ranging, realistic and feasible.

For M4, learners are required to discuss the use of the main forms of gypsum and synthetic stone materials used in dental technology. They may contextualise how gypsum and synthetic stone materials are developed to meet the mechanical and physical property requirements. Evidence may be in the same format as for P4.

M5 requires learners to justify the relevance of current health and safety guidelines for dental biomaterials. The submission must include a range of materials and consider best practice when handling materials of this nature. Evidence may be in the same format as for M1.

For M6, learners are required to justify the use of different polymeric materials in the dental laboratory, considering the materials' stated properties. They will be expected to make comparisons with generally accepted ideal requirements and in doing so explain the function of a range of polymeric materials. The evidence presented must be broad ranging, realistic and feasible.

D1 requires learners to consider all evidence of material properties and analyse the ideal properties for dental materials. The submission must include items from all of the categories of properties. Evidence may be in the same format as for M2.

D2 requires learners to evaluate waxes used in the dental laboratory. Learners' evidence should be broad ranging, with examples of dental laboratory procedures and techniques that explain the importance of selected dental waxes to meet a range of uses.

D3 requires learners to critically evaluate gypsum and synthetic stone materials used in the dental laboratory. Learners' evidence should be broad ranging, with examples of laboratory procedures and techniques that justify the exacting requirements of gypsum and synthetic stone materials.

For D4, learners are required to evaluate current polymeric materials used within the dental laboratory environment. Learners may contextualise their evidence as described in M6. Evidence may be in the same format as for M1.

## Programme of suggested assignments

The table below shows a *Programme of suggested assignments* that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, P2, M1, M2, D1 | Electronic arrangement, the periodic table and dental materials properties | Your employer is deciding who to promote to a management position and sets a science-based project relating to dental material properties and selection. | • Evidence can be provided as a formal report or a presentation engaging with e-resources and different media formats |
| P3, M3, D2 | Properties and uses of dental waxes | A dental company has left a spectrum of different waxes for you to research and make suggestions on how to improve them.<br>You are asked by the company to present your research outcomes. | • ICT presentation informing the audience of your research into dental waxes and your recommendations |
| P4, P5, M4, M5, D3 | Gypsum products and synthetic stone utilised in the dental laboratory | As part of a dental team working in a dental laboratory you have been asked to work as an action group to test the quality and manipulation of gypsum and synthetic stone materials used to produce dental casts and the safety implications of handling them. | • The test results will form part of a technical report<br>• Practical observations by the tutor<br>• Report on safety protocols when handling dental biomaterials |
| P6, P7, P8, M6, D4 | Properties and uses of a range of polymeric dental materials | Your employer has been experiencing polymeric material processing difficulties and a high number of returned appliances. They have asked you to write a report on the properties and uses of materials to help them understand these materials. | • Formal essay evidencing the uses and properties of polymeric materials |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 7: Removable Complete Prosthodontics |
| Unit 8: Removable Partial Prosthodontics |
| Unit 10: Design of Fixed Prosthodontics |
| Unit 12: Techniques for Manufacturing Fixed Prosthodontics |
| Unit 13: Orthodontic Therapy Principles |
| Unit 14: Design, Manufacture and Modification of Orthodontic Appliances |
| Unit 16: Work-based Learning in Dental Technology |

## Essential resources

Facilities required for this unit include a fully-equipped dental laboratory. The laboratory should be fitted with appropriate benching, hand pieces, extractor units, mixing machines, model trimmers, light cure boxes, pressure pots, vacuum forming machines, Bunsen burners and polishing lathes. It should also be equipped with first aid kits, fire extinguishers, PPE, infection control and safety equipment, as well as a wide range of dental materials.

Learners should be equipped with a full dental toolkit and a selection of trimming burs for a variety of materials. Personal protective equipment is mandatory.

Access to hospital and commercial dental laboratories that provide a range of dental technology services is very important.

Staff delivering this unit should be competent and experienced, and be registered dental technicians. Ideally, they should have recent laboratory experience within dental technology and show evidence of regular contact with the industry and/or technical updating. Science tutor support is advisable.

Learners will need access to library and IT facilities with a range of relevant books, journals and software applications.

## Employer engagement and vocational contexts

To further enhance the delivery of this unit it is suggested that learners are given the opportunity to access commercial and hospital laboratories as part of a work placement or field trip. Visits to material manufacturers will help them gain an understanding of the properties of the materials covered in this unit.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE1] Planning and developing their gypsum tests; setting targets and problem solving; solving mathematical problems |
| Creative thinkers | [CT1] Experimenting with gypsum separating media |
| Reflective learners | [RL6] Delivering their ICT presentations on the different types of dental waxes used in dental laboratories |
| Self-managers | [SM2,3] Recording the types of impression materials that are sent into a dental laboratory |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE2] Researching polymeric materials and their uses |
| Creative thinkers | [CT5] Experimenting with different separating media |
| Reflective learners | [RL5] Using materials in other units in this programme to help in their development in material knowledge to satisfy the learning outcomes in this unit |
| Team workers | [TM6] Responding to other learners' dental wax presentations; showing the ability to constructively feed back to the presenter |
| Self-managers | [SM1] Carrying out gypsum experiments exhibiting the ability to be flexible towards developments and challenges |
| Effective participators | [EP3] Carrying out gypsum material tests; demonstrating an ability to plan the project over a series of sessions |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Using computers to develop and deliver their presentations |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Recording information to present in a case study |
| Manage information storage to enable efficient retrieval | Saving material and assignment files in organised folders |
| Follow and understand the need for safety and security practices | Following associated health and safety procedures related to the use of computers and VDUs |
| Troubleshoot | |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Using multimedia software to formulate assignments |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Searching websites for information and demonstrating the ability to extract details that are relevant to the purpose of the task |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Able to store and recall information electronically that satisfies the requirements of the grading criteria in this unit, e.g. ICT presentation on dental waxes |
| Bring together information to suit content and purpose | Generating reports or essays which includes essential data to inform the reader of the uses of a specific dental material, e.g. polymeric dental materials |
| Present information in ways that are fit for purpose and audience | Submitting evidence in a variety of formats to meet the requirements of the brief |

| Skill | When learners are… |
|---|---|
| Evaluate the selection and use of ICT tools and facilities used to present information | Assessing their use of IT to produce documents and reflecting on their skill development needs in this area |
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Communicating using email and chat rooms (Moodle) with peers and tutors, e.g. support for assignment development |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | Using mixing ratios and quantity to test and use materials effectively |
| Identify the situation or problem and the mathematical methods needed to tackle it | Setting up the parameters of their material tests and altering factors accordingly to meet their assignment plans |
| Select and apply a range of skills to find solutions | Using timed experiments |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | Recording information in a controlled manner to ensure the validity of their experiments and results as part of a quality control process |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | Finalising their projects and preparing them for submission or presentation |
| Draw conclusions and provide mathematical justifications | Reflecting on their experiments to formulate conclusions to show their understanding of the procedures and results |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Taking part in group discussions, assignment seminars and tutorials |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Researching material using books, journals and the internet |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing technical reports, case studies and essays following the requirements of the assignment brief |

# Unit 5: Legislation, Professionalism and Ethics in Dentistry

**Unit reference number:** K/505/9563

**Level:** 3

**Credit value:** 10

**Guided learning hours:** 54

## Unit Aim

This unit develops the learner's understanding of the requirements of entering into a professional career and the legislative and ethical demands that will be placed on them once registered with the General Dental Council (GDC) as a Dental Care Professional (DCP) whose chief aim is the safety of the patient.

## Unit introduction

An integrated team approach to the dental treatment of patients ensures that the patient receives the best possible dental care in a safe and controlled environment. It is a statutory requirement for all DCPs to register with the GDC to allow them to practise in their chosen field.

Learning outcome 1 introduces learners to the concept of the delivery of dental care by a team of healthcare professionals. It delivers an insight into the roles of dental care professionals and explains how the team works together in the best interest of the patient. Various communication techniques between the members of the team will be considered and patient management, treatment plans and costs will be covered.

The treatment of patients and the construction of dental appliances is governed by legislation and regulated by the GDC. Adherence to this legislation is important to ensure the health and safety of the patient and the dental technician.

Learning outcome 2 examines the legislative requirements to practise as a dental technician and the reasons for these laws. Learners will discover the consequences to themselves and their patients of not upholding these legal requirements. As litigation is becoming more frequent in the United Kingdom, learners are given information on methods to protect themselves against prosecution.

Learning outcome 3 covers the ethical considerations involved in the treatment of patients and the consequences of failing to comply.

Learning outcome 4 requires learners to demonstrate professional conduct at the workplace, within the dental team and to those they interact with throughout their working lives.

## Learning outcomes

**On completion of this unit a learner should:**

1. Know the roles of the dental team integral to dental patient care and treatment
2. Understand the requirements of current legislation that applies to the practice of dental technology
3. Understand the ethical requirements necessary to fulfil the duties of a dental technician
4. Be able to demonstrate professional conduct towards dental team colleagues and all patients

## Unit content

**1 Know the roles of the dental team integral to dental patient care and treatment**

*Team roles*: roles, responsibilities and scope of practice e.g. dentist, dental nurse, dental hygienist/therapist, dental technician, clinical dental technician, orthodontic therapist; reasons for a team approach; the advantages and disadvantages of team working; other people involved in the treatment of patients

*Integration*: methods of communicating information; interaction between team members; treatment plans; receipt, management and return of laboratory work; methods of payment; lifelong learning; team working in the best interests of the patient

**2 Understand the requirements of current legislation that applies to the practice of dental technology**

*Registration*: reasons for statutory registration; requirements for registration purposes, e.g. qualifications, codes of practice, continuing professional development (CPD); regulatory function of the GDC; the Dentists Act 1984 (Amendment) Order 2005; principles and practices of audits carried out in a dental laboratory; ways of dealing with colleagues failing their professional responsibilities; medico-legal consequences

*Patient treatment*: laws that affect patient treatment, e.g. Human Rights Act 1998, Equality Act 2010; General Data Protection Regulations (GDPR); methods of insuring against litigation; reasons for the Medical Devices Regulation (MDR) replacing the Medical Devices Directive; consequences of not upholding legislative requirements; patient consent

*Workplace*: employee induction; employment protection; policies and procedures; job descriptions and personal specifications; equality and diversity; indemnity insurance; management of local referral networks, clinical guidelines and policies

**3 Understand the ethical requirements necessary to fulfil the duties of a dental technician**

*Ethical obligations*: GDC standards for dental professionals; personal and public morality; standards of conduct in professional and personal life; consent, duty of care and confidentiality, e.g. data storage and record keeping, data protection and patient confidentiality; patient best interests; codes of practice; equality and diversity; consequences of not upholding ethical obligations; the principles of obtaining valid consent; effective candour and communication with patients when things go wrong

*Ethical and legal dilemmas*: GDC Code of Practice, professional behaviour and ethical conduct related to the role of a dental technician, e.g. scope of practice; ethical dilemmas; patient complaints handling procedures; maintaining confidentiality; dealing with gender, racial issues, social and ethnic diversity; providing sufficient information about conditions and possible treatment; employment law; use of materials which are compliant with the Medicines and Healthcare Products Regulatory Agency (MHRA); in line with General Dental Council (GDC) regulations; undertaking and recording continuous professional development (CPD) to comply with the currently required cycle

**4 Be able to demonstrate professional conduct towards dental team colleagues and all patients**

*Professional behaviour*: body language; speech patterns; interpersonal skills; verbal and non-verbal communication, language barriers, disabilities, social welfare, ethnicity, diversity, race, colour, background, the perception of a patient, personal hygiene and dress code; compliance with GDC Code of Practice; General Dental Council; Standards for Dental Professionals; Standards for Student Dental Technicians; scope of practice compliance with organisational procedures and codes of practice; take responsibility for and act to raise concerns about your own or others' health, behaviour or professional performance

*Communication skills*: patients; patient management; recognise and respect patient's perspective, differences and expectations and the role of the dental team; dentists; treatment plans, prescriptions and contracts; dental nurses and receptionists; oral health promotion role; telephone techniques; digital communication; methods of dealing with complaints; know how and where to report any patient safety issues that arise

*Essential documentation*: e.g. GDC Standards for Dental Professionals; Standards for Student Dental technicians; scope of practice, Service Level Agreements/Patients Charter, Care Quality Commission and GDC Standards Guidance

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 describe the roles of each member of the dental team emphasising the treatments they carry out involving dental appliances [IE3, CT2] | M1 explain the reasons for a team approach to dental healthcare, including its advantages and disadvantages | |
| P2 assess the criteria required by the General Dental Council to register as a Dental Care Professional | M2 discuss the need for statutory registration for dental technicians including the requirements for continuing professional development (CPD) | D1 critically analyse the medico-legal consequences of not adhering to registration requirements |
| P3 discuss the legislation that can be applied to patient treatment involving the practice of dental technology | | |
| P4 explain the workplace legislation that applies to the management of a dental laboratory [SM3] | | |
| P5 explain how ethical obligations affect both the patient and the dental technician | M3 discuss the consequences of not adhering to the ethical requirements of the General Dental Council | |

| Assessment and grading criteria | | | | | |
|---|---|---|---|---|---|
| P6 | demonstrate professional behaviour in the dental laboratory or clinical setting | M4 | explain how a person's speech, body language and dress code might influence other people's perception of them | D2 | discuss why it is necessary to behave professionally when involved in the healthcare of others |
| P7 | contribute to treatment of patients as part of a dental team, in a professional manner [TM4, EP3] | M5 | justify the dental technician's role in the professional activities of treating a patient | D3 | critically evaluate the extended roles for dental technicians that are recognised by the General Dental Council |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

This unit requires the centre to use a variety of teaching resources to deliver the content. Interaction with other dental care professionals is an essential element of development that will embed the skills required to meet the legal and ethical demands of this professional role. Assessment of the unit requires the learner to provide evidence using a range of assessment methods.

## Delivery

Tutors delivering this unit have opportunities to use a wide variety of techniques, including lectures, discussions, group seminar presentations, workshops, film and research using the internet and/or library resources. External speakers from the various governing bodies could be invited to give presentations to learners to enhance the delivery of this subject. Delivery should encourage learners to communicate with other members of the dental team and to build good working relationships with them. It should make learners aware of the commitment and responsibility they have to their patients and to other dental team members and their personal duty to be aware of the current GDC regulations and Guidance Documents available.

Whichever delivery methods are used, it is essential that tutors stress the importance of patient and learner welfare, dental teamwork in the provision of dental healthcare and ethical and professional guidelines and behaviour.

Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may also be taking as part of the programme of study.

Learning outcome 1 can be delivered using a variety of methods but should be taught in association with other learners from the dental team. Group work and interactive workshops would be a good delivery method for this outcome to ensure learners get to know learners from other dental team groups. Visits from dental team speakers and visits to clinical environments to meet with patients and other dental team members would be beneficial to the learning experience at this early stage of the learning process. Shadowing of other team members would give an insight into their roles and duties.

Learning outcome 2 could be delivered through formal lectures and discussions. Legislation needs to be taught to give learners the opportunity of applying legislative facts to a dental laboratory environment. It is essential that learners are taught the most recent and current legislation relating to the areas specified in the content, i.e. Medical Devices Regulation (MDR), Medicines and Healthcare Products Regulatory Agency (MHRA), Equality Act 2010, Human Rights Act, General Data Protection Regulation (GDPR) 2018, Patient Consent. Learners will also need to develop an understanding of continuing professional development to comply with registration guidelines of the General Dental Council (GDC) and relevance to patient care. This could be delivered through research into the current GDC guidelines and discussion with registered dental technicians on the process and requirements.

Learning outcome 3 covers the ethical obligations necessary to carry out the role of a dental technician. Learners should be encouraged to access the guidance documents on the GDC website. Delivery techniques should be varied; it is expected that the ethical regulations and standards be taught as formal lectures but that morality, behavioural, social and ethnic diversity, and so on, might be taught through discussion groups and debating forums. Learners should be encouraged to give examples of ethical and moral dilemmas encountered in their lives. GDC Fitness to Practice cases should be reviewed and discussed in a group situation.

For learning outcome 4, learners will investigate professional behaviour amongst dental healthcare professionals. This could be delivered through role-play situations, discussion groups, shadowing colleagues and recording scenarios. Fictional medical television programmes could be used to highlight good and bad behaviour towards colleagues and patients. Visiting speakers, for example other qualified dental team members, could be used to discuss real-life situations. The GDC produces information on standards, team working, scope for practice, patient confidentiality and CPD. Other essential documents cover the MDR, MHRA, Equality Act 2010, General Data Protection Regulation (GDPR) 2018, Human Rights Act 1998. GDC online standards and guidance documents should be reviewed.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Know the roles of the dental team integral to dental patient care and treatment* | |
| Introduction to the dental team members and their roles, and scope of practice during the treatment of patients | 1 |
| Examine the roles and responsibilities of each team member | 2 |
| Discuss the reasons for a team approach, in the best interests of the patient | 2 |
| Debate the advantages and disadvantages of team working | 1 |
| Introduce other healthcare professionals that may be employed in the dental treatment of patients | 2 |
| Discuss professional relationships within the dental team | 2 |
| Personal research and study time | 2 |
| **Assignment 1: The roles of the dental team integral to dental patient care and treatment** (P1, M1) | 8 |
| **Learning outcome 2** | |
| *Understand the requirements of current legislation that applies to the practice of dental technology* | |
| Introduce the current legislation relevant to dental technology and the practice of dentistry | 1 |
| Discuss the requirements of professional registration onto the General Dental Council's DCP register | 2 |
| Examine the effects of non-compliance with regulatory legislation | 1 |
| Discuss the legislation related to patient treatment, e.g. Human Rights Act 1998, Equality Act 2010, GDPR 2018<br>Investigate the reasons for the Medical Devices Regulation (MDR) and the role of the Medicines and Healthcare Products Regulatory Agency (MHRA) | 3<br>3 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Discuss the commitments of the employer to employment laws | 3 |
| Investigate the sources of professional advice, the management of local referral networks, clinical guidelines and policies | 2 |
| Discuss the principles and practices involved in dental laboratory audits, employment laws, personal specifications, ethnicity, equality, diversity and social background | 2 |
| CPD – GDC guidelines for continuing professional development and the benefits for the patient | 2 |
| Personal research and study time | |
| **Assignment 2: The requirements of current legislation that applies to the practice of dental technology** (P2, P3, P4, M2, D1) | 10 |
| **Learning outcome 3** | |
| *Understand the ethical requirements necessary to fulfil the duties of a dental technician* | |
| Introduce the ethical requirements necessary to fulfil the duties of a dental technician | 1 |
| Discuss the ethical requirements for a registrant of the General Dental Council and standards for dental professionals | 2 |
| Debate personal and public morality | 1 |
| Discuss the standards of conduct in professional and personal life | 2 |
| Ethical scenarios for discussion – GDC code of practice, Fitness to Practice, professional behaviour and ethical conduct<br>Ethical dilemmas<br>Patient complaints handling<br>Maintaining confidentiality<br>Dealing with gender and race issues | 8 |
| Providing sufficient information about conditions and possible treatment | 2 |
| Employment law | 1 |
| Fraud – use of correct materials | |
| MHRA regulation of materials in the oral cavity | |
| CPD – GDC guidelines for continuing professional development and the benefits for the patient | 3 |
| Discuss issues focusing on patient confidentiality<br>Debate the subject of patient consent | 1 |
| Consider additional ethical responsibilities for dentistry in the areas of product development for involved clinical and laboratory applications and research | 2 |
| Personal research and study time | 4 |
| **Assignment 3: The ethical requirements necessary to fulfil the duties of a dental technician** (P5, M3) | 8 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 4** | |
| *Be able to demonstrate professional conduct towards dental team colleagues and all patients* | |
| Introduce the requirements of a professional health vocation. Discuss behavioural patterns: body language; speech patterns; interpersonal skills; verbal and non-verbal communication, language barriers, disabilities, social welfare, ethnicity, diversity, race, colour, background, the perception of a patient, personal hygiene and dress code | 4 |
| Discuss the communication with potential contacts that are involved with the treatment of patients; recognise and respect patient's perspective and expectations, and the role of the dental team | 1 |
| Discuss the legal requirements of communication and data protection | 1 |
| Introduce (1) General Dental Council: Standards for Dental Professionals, Principles of Dental Team Working, Scope for Practice, Candour, oral health promotion, take responsibility for and act to raise concerns about your own or others' health, behaviour or professional performance. Maintaining Standards, Principles of Patient Confidentiality, CPD for dental care professionals | 2 |
| (2) Compliance documentation: Medical Devices Regulation (MDR), Medicines and Healthcare Products Regulatory Agency, Equality Act 2010, Human Rights Act 1998, General Data Protection Regulation (GDPR) 2018, | 2 |
| Personal research and study time | 2 |
| **Assignment 4: Demonstrating professional conduct towards dental team colleagues and all patients** (P6, P7, M4, M5, D2, D3) | 4 |
| **Total learning time hours** | **101** |

## Assessment

To achieve a **pass** grade, learners must achieve **all seven** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all five** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all three** distinction criteria as outlined in the grading grid.

For P1, learners will be expected to describe the roles involved in the dental team and give a brief description of each member's role and responsibilities. Evidence for this could take the form of a pictorial presentation; poster or leaflet with notes for presentation to the cohort. Alternatively, this could be evidenced as a project.

For P2, learners must assess the criteria required by the General Dental Council to register as a Dental Care Professional. Evidence for this could be presented as an information leaflet for new recruits to dental technology. Alternatively this could be evidenced as a project with P3 and P4.

For P3, learners must discuss the application of relevant legislation in relation to the treatment of patients who will need appliances fabricated by a dental technician. Evidence for this could be presented as an information poster for new recruits to dental technology. Alternatively this could be evidenced as a project with P2 and P4.

For P4, learners must explain the workplace legislation that is applicable to the running of a dental laboratory. This could be evidenced through an oral presentation or as a project with P2 and P3.

P5 requires learners to explain the ethical obligations that are relevant to the treatment of patients. Evidence for this criterion could be provided in a written report.

P6 asks learners to demonstrate the ideal professional conduct and behaviour that an individual will have to exhibit to meet professional obligations. Evidence for this criterion could be observed in a workplace setting or could be through a written expert witness testimony supporting a written report and linked to P7.

For P7, learners must contribute to treatment of patients in a professional manner as part of a dental team. This could be evidenced by a statement of conformity which is issued by the manufacturer and delivered with the appliance for the patient (recipient) on request. This should be provided by the workplace supervisor with an authorised signature and verified by the tutor. Alternatively this may be evidenced as part of a project with P1 and P4.

For M1, learners need to explain the reasons for a team approach to dental healthcare, including its advantages and disadvantages. This can be directly linked to work undertaken for P1. Evidence for this could take the form of a pictorial presentation with notes or using a slide presentation to the cohort. Alternatively this could be evidenced as a project.

For M2, learners must discuss the need for statutory registration for dental technicians including the importance of maintaining CPD records. This can be directly linked to work undertaken for P2. Evidence for this could be presented as an information leaflet for new recruits to dental technology. Alternatively, this could be evidenced as a project with M3.

M3 requires learners to discuss the consequences of failing to adhere to the ethical requirements of the GDC. Evidence for this criterion could be provided in a written report.

For M4, learners must explain how a person's speech, body language and dress code might influence other people's perception of them. This can be directly linked to work undertaken for P6 Evidence for this could be presented as an information leaflet for new recruits to dental technology. Alternatively this could be evidenced as a project with M5.

M5 requires learners to justify the role of a dental technician during the treatment of patients. Evidence for this could be in the form of a journal recording the activities undertaken by a dental technician to fulfil the requirements of a dental prescription form.

For D1, learners are required to critically analyse the medico-legal consequences of not adhering to registration requirements. This can be directly linked to work undertaken for P2 and M2. Evidence may be in the same format as for M2.

For D2, learners must discuss why it is necessary to behave professionally in the healthcare of others. Learners should consider the implications, both personally and to the organisation, of not behaving professionally. This could be evidenced in the form of notes taken from a group or individual discussion. Alternatively it may form part of a project with M5 and D3.

D3 requires learners to critically evaluate the extended roles of the dental technician that have been recognised by the General Dental Council. The evaluation should include the importance of the roles and the interrelationship with other dental professionals. Evidence may be in the format of a written report.

## Programme of suggested assignments

The table below shows a *Programme of suggested assignments* that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, M1 | The roles of the dental team integral to dental patient care and treatment | You are working for a dental technology department within a Primary Care Trust and have been asked by your line manager to produce a presentation as part of a marketing strategy that can be used to promote the dental team and help educate patients. Posters and leaflets can also be designed to further enhance the presentation. | • Design and produce posters and leaflets to present the relevant information<br>• Oral presentations using PowerPoint or Prezi may be used for the merit grade |
| P2, P3, P4, M2, D1 | The requirements of current legislation that applies to the practice of dental technology | You are considering setting up a dental laboratory in this country and as part of this process you will need to comply with a range of compulsory legislation associated with the production of dental custom-made devices. To ensure compliance you need to write a report on all aspects of legislation that meets the requirements of the GDC, MHRA, MDR and relevant employment laws and European factors.<br>The report should also include a review of legislation that applies to patient treatment and to the running of a dental laboratory. | • Write a report on the compulsory legislative requirements of registration with the GDC, the reasons for them and the consequences of not adhering to the registration requirements. |

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P5, M3 | The ethical requirements necessary to fulfil the duties of a dental technician | Your work-based mentor is employing new staff and wants them to be aware of the ethical demands on the dental technician. They have asked you to write a report on the ethical aspects of being a dental technician. | • Write a report on the ethical obligations of a healthcare professional and how to comply with the GDC's standards of conduct |
| P6, P7, M4, M5, D2, D3 | Demonstrating professional conduct towards dental team colleagues and all patients | Becoming a dental technology professional involves professional and personal skills development. This assignment has been designed to allow you to consider the professional behaviour of a registrant. You will be in contact with other team members and patients in the working environment and you will need to exhibit a level of professionalism conducive to this relationship.<br>Personal conduct can also affect registration so you should consider your conduct in your personal life. | • Evidence to be sourced from tutor notes of a student group discussion on the requirements of professionalism<br>• Work-based observation and/or statement of conformity is essential to quantify adherence to professionalism in the work placement<br>• Written report |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 2: Medical Emergencies, First Aid and Communication in the Dental Team |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 4: Basic Dental Materials Science |
| Unit 6: Dental Public Health and Preventative Dentistry |
| Unit 7: Removable Complete Prosthodontics |
| Unit 8: Removable Partial Prosthodontics |
| Unit 9: Dental Laboratory Compliance |
| Unit 10: Design of Fixed Prosthodontics |
| Unit 11: Complex Dental Materials Science |
| Unit 12: Techniques for Manufacturing Fixed Prosthodontics |
| Unit 13: Orthodontic Therapy Principles |
| Unit 14: Design, Manufacture and Modification of Orthodontic Appliances |
| Unit 16: Work-based Learning in Dental Technology |

## Essential resources

Facilities required for this unit include a fully-equipped dental laboratory. The laboratory should be fitted with appropriate benching, hand pieces, extractor units, mixing machines, model trimmers, light cure boxes, pressure pots, vacuum forming machines, Bunsen burners and polishing lathes. It should also be equipped with first aid kits, fire extinguishers, all PPE, infection control and safety equipment, as well as a wide range of dental materials.

Learners should be equipped with a full dental toolkit and a selection of trimming burs for a variety of materials. Personal protective equipment is mandatory.

Access to hospital and commercial dental laboratories that provide a range of dental technology services is very important.

Staff delivering this unit should be competent and experienced, and be registered dental technicians. Ideally, they should have recent laboratory experience within dental technology and show evidence of regular contact with the industry and/or technical updating. Mathematics and science tutor support is advisable.

Learners will need access to library and IT facilities with a range of relevant books, journals and software applications.

## Employer engagement and vocational contexts

Learners will benefit from work experience in a dental laboratory and guidance from a designated work-based mentor. Access to compulsory documentation will help the learner to understand the legal and professional standard requirements associated with dental technology.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are … |
|---|---|
| Creative thinkers | [CT2] Asking questions about the roles of the dental team during a short interview |
| Team workers | [TM4] Actively taking part in a group discussion to meet the grading criteria for learning outcome 4 |
| Self-managers | [SM3] Investigating the implementation of legislation in their working environment; organising the resources for discussion and setting up a meeting with their work-based mentor |
| Effective participators | [EP3] Developing their skills and roles within the dental team |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are … |
|---|---|
| Independent enquirers | [IE3] Exploring the reasons, advantages and disadvantages of registration with the GDC; considering the perspective of the patient, clinician, laboratory and the dental technician |
| Creative thinkers | [CT6] Developing their ideas of the consequences of non-conformance to the registration of dental technicians |
| Reflective learners | [RL4] Discussing their assignment grades and how the project can be improved to increase the overall grade |
| Team workers | [TM6] Debating points of interest during group discussions; providing peers with positive and constructive feedback |
| Effective participators | [EP5] Debating issues during group discussions |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Working towards their dental team leaflet; finding information to add to project |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Setting up a process to manage their studies; evaluating the effectiveness of the process in group discussions |
| Manage information storage to enable efficient retrieval | Saving information and assignments in suitable files to facilitate easy recall |
| Follow and understand the need for safety and security practices | Using computers to store patient information in the laboratory environment |
| Troubleshoot | |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Researching on the internet for their assignment and class work |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Using suitable websites; deciphering information to add into assignments |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Storing information of their assignments electronically so they can be easily found and assessed |
| Bring together information to suit content and purpose | Creating assignment work in the form of written reports and patient information leaflets |
| Present information in ways that are fit for purpose and audience | Presenting assignment work in the agreed format |
| Evaluate the selection and use of ICT tools and facilities used to present information | Evaluating the format of their assignments with the tutor and peers and presenting ideas on how it could be improved |

| Skill | When learners are… |
|---|---|
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Communicating information via the email system including the attaching of files; taking part in chat rooms set up to help with their unit |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Discussing the roles of the dental team and taking an active part in a professional conduct debate in learning outcome 4 |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading recommended text on a given subject to help formulate an understanding of the material |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing assignments and patient leaflets following assignment briefs |

# Unit 6: Dental Public Health and Preventative Dentistry

**Unit reference number:** T/505/9582

**Level:** 3

**Credit value:** 5

**Guided learning hours:** 26

## Unit Aim

The aim of this unit is to give learners an insight into how dental public health is administered and how dental care professionals can contribute towards preventative dentistry, which helps reduce the need for dental treatment.

## Unit introduction

Dental public health is the science and practice of measures to prevent the onset of oral diseases of the teeth and neighbouring soft tissues, promoting oral health and improving the quality of life through the organised efforts of society.

This unit will give learners an insight into how the dental team provides a service to an individual and a community.

This unit will provide learners with the knowledge of how dental public health concerns itself with the sociological, behavioural, environmental and economic influences on the oral health of the population and the availability of effective and efficient services to restore the dentally diseased to health.

Learners will discover how preventative dentistry is the modern way of reducing the amount of dental treatment necessary to maintain a healthy oral environment.

This unit covers the modern approach to dental public health and its aims to improve oral healthcare through appropriate preventative dentistry, oral healthcare education and treatment services, equipping individuals and agencies with information for effective decision-making.

Learners will find out how to design and advise on the construction of custom-made dental devices to help reduce further potential damage to the oral mucosa and remaining teeth.

## Learning outcomes

**On completion of this unit a learner should:**

1. Understand how the dental team functions within the community
2. Understand the factors which contribute to oral health or illness
3. Understand the procedures of preventative dentistry
4. Understand how to design dental appliances to minimise their potential to cause further oral disease

## Unit content

**1 Understand how the dental team functions within the community**

*Hospital dental services:* organisation; scope; special needs dentistry; special care dentistry; orthodontics; oral surgery; conservation; prosthetics; regional differences throughout the UK

*Community dental services:* organisation; scope; paediatrics; school screening; orthodontics; health clinics; health centres; domiciliary visits

*General dental practice:* organisation; scope

*Communication and education:* oral health promotion (effective communication, information); dental practitioners; oral health educators; hygienists; dental nurses; therapists; dental technologists; practice managers; receptionists; communication and feedback with other healthcare professionals in the interests of the patient

**2 Understand the factors which contribute to oral health or illness**

*Sociological:* beliefs; values; gender; age; social class; culture; occupation; respect for equality and diversity

*Behavioural:* attitudes; loss of interest; lack of care; recognise patient's choice in treatment planning

*Environmental:* living conditions; psychological and physiological conditions; disease; drinking water; diet; habits (smoking, alcohol, sugar consumption)

*Economic factors:* employment; lifestyle; affordability; dental products

**3 Understand the procedures of preventative dentistry**

*Preventative dentistry measures:* clinical guidelines; regular check-ups; diet; fluoride; teeth brushing; flossing; mouthwash; pit and fissure sealants; use of straws; sugar-free gum; primary prevention; secondary prevention; tertiary prevention; accountability

*Care of existing dental appliances:* full dentures; partial dentures; immediate dentures; orthodontic appliances; crowns; bridges; implants

*Studies and surveys:* studies (experience, incidence, prevalence); national dental surveys; oral health strategies; minimum standards; quality of care

**4 Understand how to design dental appliances to minimise their potential to cause further oral disease**

*Prosthetics design criteria:* baseplate extension (full, acrylic partial and acrylic/metallic partial); placement of retentive devices (clasps); placement of reciprocation; partial denture support (occlusal rests, cingulum rests, onlays); placement of connectors; implant retained removable appliances

*Conservation design criteria:* mesial; distal; labial; buccal; lingual and occlusal surfaces of fixed restorations (all porcelain crowns, bonded crowns, light-cure composite crowns, multi-unit bridges, minimal preparation bridges, all metal restorations, veneers, implant retained appliances); substructure design

*Orthodontic design criteria:* extension of baseplate; wire work (extension, force, design)

*Legislation:* health and safety, liability; quality assurance

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 explain how community dental services provide a service to an individual [IE3, CT2] | M1 discuss the relationships between community dental service providers when providing a service to an individual | D1 evaluate the dental services that are available to an individual and suggest improvements |
| P2 explain the sociological, behavioural, environmental and economic factors that can affect illness or the oral health of an individual [IE5] | M2 discuss how the sociological, behavioural, environmental and economic factors influence an individual's oral health | D2 evaluate how the sociological, behavioural, environmental and economic factors that impact on an individual's oral health can be reduced or eliminated |
| P3 discuss the preventative dentistry measures currently employed to reduce and control dental disease [SM3] | M3 assess the successes and limitations of currently employed preventative dentistry measures in reducing and controlling dental disease | D3 analyse currently employed preventative dentistry measures and comment on their effectiveness |
| P4 discuss the recognised design criteria for dental appliances that are used to reduce further oral disease [IE4] | M4 justify how the design criteria for dental appliances helps prevent further damage to the remaining dentition and oral tissues | D4 analyse the design criteria for dental appliances and suggest improvements |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| | |
|---|---|
| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |

# Essential guidance for tutors

## Delivery and assessment guidance

Learners need access to the range of dental services available to the general public to enable them to form an understanding of how these services function. Learners also require access to dental laboratories that offer all dental specialities to enable them to acquire the necessary information from technical staff regarding the design of dental appliances.

## Delivery

Tutors delivering this unit have the opportunity to utilise a wide range of teaching and learning techniques. A learner-centred approach is suggested for this unit, and a formal input from lectures and the use of library and internet resources is recommended. Group discussions will help learners develop an all-round appreciation of this area of study.

It is recognised that periods of clinical observation and patient contact are invaluable as a learning resource. However, this is not always practicable, in which case access to a range of high-quality audio-visual materials is suggested.

## Outline learning plan

The *O*utline learning *plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcomes 1, 2 and 3** | |
| *Understand how the dental team functions within the community* | |
| *Understand the factors which contribute to oral health or illness* | |
| *Understand the procedures of preventative dentistry* | |
| Introduction on dental services available to individuals | 2 |
| Visit hospital dental services to observe the roles of the dental team and discuss the range of treatments and services offered | 6 |
| Visit community dental services to observe their role in the community | 2 |
| Visit a general dental practitioner to discuss treatments | 2 |
| Meet with an oral health educator to discuss information that is available to patients and their role in dental health education. Obtain patient information leaflets | 2 |
| Discuss with a hygienist their role and the advice they give to patients. If possible, observe a treatment | 2 |
| Personal study time and research | 4 |
| **Assignment 1: Preventative dentistry through the dental team** (P1, P2, P3, M1, M2, M3, D1, D2, D3) | 8 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 4** | |
| *Understand how to design dental appliances to minimise their potential to cause further oral disease* | |
| Introduction and discussion on relevant material and research | 4 |
| Research texts and internet regarding topic | 2 |
| Meet dental staff to discuss patient treatment options | 2 |
| Observe the design and construction of appliances for the different specialties | 7 |
| Collect images of completed appliances relevant to research | 1 |
| Personal study time | 2 |
| **Assignment 2: Design of dental appliances** (P4, M4, D4) | 6 |
| **Total learning time hours** | **52** |

## Assessment

To achieve a **pass** grade, learners must achieve **all four** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all four** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all four** distinction criteria as outlined in the grading grid.

For P1, learners will be expected to explain the dental services that are available to an individual. Learners must include hospital, community and general dental practice. This may be evidenced through a written assignment.

For P2, learners must explain how various sociological, behavioural, environmental and economic factors impact on the oral health of an individual. This may be evidenced through a written assignment.

For P3, learners must discuss the current preventative dentistry measures that are employed to reduce and control dental disease. This may be evidenced through a written assignment.

For P4, learners must discuss the current recognised design criteria for custom-made dental devices covering the three dental specialties. This may be evidenced through a written assignment.

For M1, learners must discuss the relationships between dental service providers when delivering a community dental service to an individual. This may be evidenced through a written assignment.

For M2, learners must discuss how sociological, behavioural, environmental and economic factors influence an individual's oral health. This may be evidenced through a written assignment.

For M3, learners are required to assess the successes and limitations of currently used preventative dentistry measures in reducing and controlling dental disease. This may be evidenced through a written assignment.

For M4, learners must justify how the correct design of custom-made dental devices can limit further deterioration of the remaining dentition and oral tissues. The evidence may be supported by diagrams and include all the dental specialties. This may be evidenced through a written assignment.

For D1, learners must evaluate the dental health services that are available and then suggest how they could be improved for the welfare of the individual. This may be evidenced through a written assignment.

For D2, learners must evaluate the factors that impact on the oral health of individuals and then suggest how they can be reduced or eliminated. This may be evidenced through a written assignment.

For D3, learners need to analyse the currently available preventative dentistry measures, comment on their effectiveness and suggest potential improvements. This may be evidenced through a written assignment.

For D4, learners must analyse recognised design criteria for custom-made dental devices. They must include all the dental specialties, comment on their effectiveness and suggest improvements. Images must be included to support the analysis. This may be evidenced through a written assignment.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, P2, P3, M1, M2, M3, D1, D2, D3 | Preventative dentistry through the dental team | As a member of the dental team you must be aware of other dental team members' duties and responsibilities. This can be achieved by visiting various dental services available to individuals. You should document any relevant observations or communication that occurs during these visits. | • Written assignment containing a method of communicating oral health education (e.g. leaflet, pamphlet etc.) to the public |
| P4, M4, D4 | Design of dental appliances | You are working in a laboratory and have the opportunity to rotate within the different dental specialties. You will observe experienced technicians designing custom made dental appliances. You will keep notes for future reference. | • Written assignment containing diagrams |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 4: Dental Anatomy, Physiology and Disease |
| Unit 7: Removable Complete Prosthodontics |
| Unit 8: Removable Partial Prosthodontics |
| Unit 10: Design of Fixed Prosthodontics |
| Unit 14: Design, Manufacture and Modification of Orthodontic Appliances |

## Essential resources

Specialist lecturers are essential for the delivery of this unit. Library resources should be accessible along with access to ICT facilities and a range of appropriate textbooks and journals to develop learners' understanding.

## Employer engagement and vocational contexts

It is important that links are established between all members of the dental team and that learners have access to the various dental services to enable them to obtain an in-depth understanding of how they operate and to observe the role of each dental care professional.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE4] Analysing and evaluating information obtained during discussions with dental personnel and deciding on its relevance to their research |
| Creative thinkers | [CT2] Asking questions |
| Self-managers | [SM3] Organising time and resources |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Self-managers | Handing in assignments on time |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Using an ICT system to find information |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Compiling information, images and transferring into allocated files; reflecting on the finished work and the way it was compiled |
| Manage information storage to enable efficient retrieval | Saving information and assignment work in a folder |
| Follow and understand the need for safety and security practices | Aware of keeping their password safe and not disclosing it to others |
| Troubleshoot | Able to identify a fault and know how to report it |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Collecting information from books, journals, the internet and hand-outs supplied by the tutor |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Obtaining information from identified websites and assessing whether it suits the purpose of the task |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Making sure that the information they require is obtainable from a website, e.g. images of dental appliances and equipment |
| Bring together information to suit content and purpose | Creating a single document that has all the information for their report |
| Present information in ways that are fit for purpose and audience | Presenting the information the way it has been requested in the brief, e.g. written assignments |
| Evaluate the selection and use of ICT tools and facilities used to present information | Discussing how the documents could be improved |

| Skill | When learners are… |
|---|---|
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Using email to send centre produced work to own address; keeping their messages and replies safe; creating a list of suppliers regarding materials |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Discussing with other dental care professionals their roles, responsibilities and treatments they provide; explaining their role to other dental care professionals |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading lecture hand-outs and information obtained from the internet, books and journals |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing assignments |

# Unit 7: Removable Complete Prosthodontics

**Unit reference number:** F/505/9584

**Level:** 3

**Credit value:** 15

**Guided learning hours:** 30

## Unit Aim

This unit enables learners to develop their knowledge and practical skills in the design and construction of complex removable complete prosthodontic appliances. It gives learners an insight into the frequently requested modifications for this type of appliance and types of precision attachment systems that use implants or remaining teeth.

## Unit introduction

Dental technicians are part of a multi-disciplinary team who meet the specific needs of patients. They need to be aware of factors that create problems for the complex edentulous patient and that they have an important role in providing a successful outcome to a treatment which will have a positive effect on health and wellbeing.

Learners will find out how incoming work is received and processed through a dental laboratory from receipt of impressions to the finished appliance and how the interpretation of prescriptive data aids the process.

This unit will teach learners how to meet clients' requirements and provide technical advice for requested complex removable complete prosthodontic appliances.

Learners will develop the knowledge and practical skills to plan, design and construct complex removable complete prosthodontic appliances for edentulous patients using average value and fully adjustable articulators.

Learners will be made aware of the most common modifications to removable complete prosthodontic appliances at try-in stage and before or after finish.

Learners will find out how to incorporate components that strengthen the appliance and reduce masticatory load on underlying structures. They will also learn about the systems available to improve retention and stability of removable appliances for the benefit of the patient.

## Learning outcomes

### On completion of this unit a learner should:

1. Understand how to receive work into a dental laboratory
2. Be able to construct removable complete prosthodontic appliances
3. Understand the modifications requested for removable complete prosthodontic appliances
4. Understand the types of implant and precision attachment systems associated with removable complete prosthodontic appliances

## Unit content

### 1 Understand how to receive work into a dental laboratory

*Communication with team members*: terminology related to removable complete prosthodontics; methods of developing, maintaining and improving communication; importance of communicating in an appropriate manner; design requests; treatment plan; needs of the patient; clarification of design; impact of clinical governance; feedback; role of oral health promotion

*Receiving work*: contract review; type of information and data to establish requirements; prescription analysis; decontamination and infection control; seeking advice and recognising own capabilities; meeting clients' requirements; laboratory's capabilities; evaluating the casts or digital information; evaluating the need for a more complex treatment; reasons for maintaining accurate and up-to-date records; protection and management of records

*Progression of work in the dental laboratory*: progressing work according to treatment plan; procedure for referring work to a more experienced technician/department/laboratory

*Professional expectations and requirements*: act within professional and ethical standards and clinical guidelines

### 2 Be able to construct removable complete prosthodontic appliances

*Prescription:* determining the requirements from the information available and putting patient interests first; ensuring materials and equipment are fit for purpose, following guidelines and complying with legislation

*Selection of materials and teeth*: trial base requirements; types of trial base materials; tooth selection by information from various sources; forms of anterior and posterior teeth; polymeric materials; soft liners

*Design requirements*: retaining and displacing forces; peripheral extension; denture contours; denture stability and retention; neutral zone; fraenum attachments; tongue space; inclusion of co/ch bases and strengtheners; need to reduce masticatory loading; tissue support; aesthetics; phonetics; function of occlusion and temporomandibular joint; immediate tooth replacement

*Designing the appliance*: trimming cast to prescription requirements; articulating master models (transferring registration information); surveying and blocking out unwanted undercuts; duplicating models

*Aesthetics*: position of teeth to meet registration information; centre line; lip support; overbite/overjet; irregular setting; trimming and staining teeth; shade matching; interchanging moulds; shade of denture base

*Tooth-setting requirements*: general tooth setting for Class I, II and III skeletal patterns; balanced occlusion; compensating curves; protrusive and working contacts

*Waxing*: forms of contouring; stippling; rugae simulation; peripheral outline and thickness; palatal thickness; surface finish and presentation

*Flasking and packing techniques*: mould production; eliminating wax; coating plaster with a suitable separating agent; inclusion of cobalt/chrome base; strengtheners; soft lining; trial closure; mixing polymeric material according to manufacturer's instructions; processing polymeric materials including injection moulding; de-flasking processed removable prostheses without damage

*Finishing*: techniques, materials and equipment used for trimming and polishing

*Re-mounting techniques*: re-establishing vertical dimension; balancing the occlusion

*Health and safety*: infection control; risk assessment; working within health and safety regulations; PPE; equipment-recorded maintenance; reporting faults; incident reporting; Control of Substances Hazardous to Health Regulations (COSHH) 2002; appropriate precautions when moving and handling materials and equipment; waste disposal

*Quality assurance:* quality checks at each stage; packing and returning trial or finished removable prosthesis to client on time; statement of manufacture; legal and regulatory requirements

**3 Understand the modifications requested for removable complete prosthodontic appliances**

*Modifications*: fitness for purpose; altering vertical dimension; centre line; tooth position; replacing teeth; base extension/reduction; inclusion of strengtheners; soft lining and tissue conditioner; cobalt/chrome base; grind-in; adjusting/reshaping base; repositioning post dam; relining and rebasing; use of existing appliance as a basis for an obturator

**4 Understand the types of implant and precision attachment systems associated with removable complete prosthodontic appliances**

*Clinical and laboratory communication:* principles and use of digital design and manufacture; terminology relating to implant and precision attachment systems; diagnostic and treatment planning through interdisciplinary co-operation; information required for transferring clinical data; ordering materials and components; costings

*Implants utilised to retain complete dentures:* osseo integrated; metal frameworks; substructure manufacture; diagnostic set-up to establish position of teeth (aesthetics, centre line, tooth position); anterior/posterior function; radio-opaque markers; CT-scanning or x-rays to identify implant position; surgical guides/transfer systems; silicone matrixes; prosthesis fabrication

*Precision attachments utilised to retain removable complete prosthodontic appliances:* treatment planning; tooth preparation for tooth supported complete appliances; abutments (non-coping, coping, attachments); implant retained attachments; magnets; studs (Ceka, Dalbo, Rothermann); bars (Dolder); soldering

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 explain the procedures used for receiving patient work into a dental laboratory [CT2] | M1 discuss the progress of a dental appliance through the dental laboratory from acceptance to despatch | |
| P2 describe how occlusal registration data determines the setting of teeth for Class I, II and III patients | M2 explain the variations in anterior and posterior tooth settings for Class I, II and III patients | D1 analyse prescription requests to determine how they affect the appearance and setting of teeth for Class I, II, III patients |
| P3 construct removable complete prosthodontic appliances, from a given prescription, to a fit-for-purpose standard [RL3, SM3] | | |
| P4 explain the circumstances under which modifications may be requested for removable complete prosthodontic appliances | M3 discuss how commonly requested modifications to removable complete prosthodontic appliances are carried out | D2 evaluate modifications to removable complete prosthodontic appliances to ensure they have been carried out to a fit-for-purpose standard |
| P5 explain the common types of implant and precision attachment systems that are used to retain and stabilise removable complete prosthodontic appliances | M4 assess the clinical and laboratory procedures used to incorporate an implant or a precision attachment into a removable complete prosthodontic appliance | D3 evaluate the importance of a team approach in achieving a successful outcome for an implant or precision attachment treatment plan |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

Learners need access to a fully-equipped dental laboratory with experienced personnel who have the knowledge and experience to support them while they are completing their removable complete prosthodontic appliances. The technical personnel should also have a working knowledge of available retention systems so they can advise learners on these systems.

## Delivery

A learner-centred approach is suggested for this unit and any formal input from lectures and background reading should be consolidated in a simulated work environment. The simulated work environment should be the main vehicle for developing understanding through application. Simulation exercises should be supported by demonstrations, case studies, formal lectures and independent study. Group discussions and evaluation of simulated work to set and agree checklists will help a learner develop an all-round appreciation of the quality control aspect of this area of work.

Theory and practice must be integrated to enable learners to apply knowledge to realistic complete denture design and construction. The importance of detailed analysis, construction and action planning should be emphasised.

Evidence for learning outcomes could be generated through time-constrained assignments monitored in the classroom and laboratory. Quality checks are regarded as good working practice and are therefore essential to the unit.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Understand how to receive work into a dental laboratory* | |
| Theory input | 3 |
| Discuss and observe work acceptance and progression during a visit to a hospital service laboratory including professional expectations | 4 |
| Discuss and observe work acceptance and progression during a visit to a private laboratory | 4 |
| Personal study time and research | 6 |
| **Assignment 1: Dental laboratory procedures** (P1, M1) | 4 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcomes 2 and 3** | |
| *Be able to construct removable complete prosthodontic appliances* | |
| *Understand the modifications requested for removable complete prosthodontic appliances* | |
| Theory input/tutor contact | 10 |
| Plan and prepare for practical tasks | 4 |
| Articulate models for set-up and try-in | 4 |
| Select teeth and materials for set-ups | 2 |
| Set up teeth and wax up ready for try-in | 20 |
| Complete self-assessment sheets | 1 |
| Complete quality checks | 1 |
| Flask, pack and finish | 14 |
| Complete quality checks | 2 |
| Complete a quality check on finished appliance | 1 |
| Complete self-assessment sheets | 2 |
| Personal study time and research | 10 |
| **Assignment 2: Complex removable complete prosthodontic appliance construction and modification** (P2, P3, P4, M2, M3, D1, D2) | 18 |
| **Learning outcome 4** | |
| *Understand the types of implant and precision attachment systems associated with removable complete prosthodontic appliances* | |
| Theory input | 4 |
| Research information: diagrams, pamphlets, technical journals, laboratory and clinical procedure manuals, suppliers, catalogues, costs | 10 |
| Discuss implant and attachment systems with senior technical staff | 4 |
| Discuss implant and attachment systems with senior clinical staff | 4 |
| Personal study time and research | 8 |
| **Assignment 3: Implant and precision attachment systems for removable complete prosthodontic appliances** (P5, M4, D3) | 10 |
| **Total learning time hours** | **150** |

## Assessment

Assessment is an important factor in the way in which learners use and manage their time. Evidence could be collected using assignments that allow for effective and meaningful feedback. In the development of knowledge, skills and attitudes appropriate to the practice of dental technology, the importance of learner progression through the unit must be acknowledged. Competence should be achieved at the level of qualification, so learners must see the value of stages along the way.

To achieve a **pass** grade, learners must achieve **all five** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all four** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all three** distinction criteria as outlined in the grading grid.

For P1, learners must explain commonly used procedures for receiving patient work into a dental laboratory. Learners could be given laboratory prescriptions and use this information to interpret and make decisions regarding acceptance.

For P2, learners must describe how occlusal registration data determines the setting of anterior and posterior teeth for Class I, II and III patients. They should provide diagrams of the occlusal relationship of each class.

For P3, learners must construct complex removable complete dentures. This could be Class I, II and III and then proceed with one to finish. The assessor should give feedback to learners during construction and learners should self-assess their work at each stage.

For P4, learners must explain the circumstances under which modifications may be requested for a complete denture at different stages of construction or after completion. This evidence should be produced in table form with the modification, the construction technique and reasons why it may be requested.

For P5, learners must explain the use of common types of implant and precision attachment systems that are available for removable complete dentures and include manufacturers' literature.

For M1, learners must discuss the progress of a dental appliance through a dental laboratory. Their evidence should explain each stage of the progression route, the procedures used if the appliance requires advanced techniques or the dental laboratory cannot offer a particular service.

For M2, learners must explain how variations in the basic setting of anterior and posterior teeth may be changed. This evidence should be in written form and learners should provide diagrams of non-basic anterior tooth settings.

For M3, learners must discuss how commonly requested modifications to removable complete prosthodontic appliances are carried out. This evidence should be produced in the format of standard operating procedures (SOP).

For M4, learners must assess the clinical and laboratory procedures used to incorporate an implant or precision attachment device into a removable complete appliance. Evidence should be produced by selecting one of the systems from P5 and include diagrams of the various stages of the process.

For D1, learners must analyse how prescription and patient requests can determine how anterior teeth are set or altered. Evidence should be in written form and describe the information that may be received regarding how anterior teeth are positioned to improve a patient's appearance or to achieve patient requests.

For D2, learners must evaluate a selection of modified complete appliances. Evidence can be completed quality check sheets relevant to the modification, including an overall final conclusion for each modification.

For D3, learners must evaluate the importance of a multi-disciplinary team approach in achieving a successful outcome using an implant or precision attachment system. To produce evidence, learners should select a system and describe each team member's part in the process.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, M1 | Dental laboratory procedures | You have just started work in a dental laboratory and as part of your induction you have to know laboratory procedures for incoming work; you will shadow a member of staff and then be observed carrying out this procedure. | • Observation record |
| P2, P3, P4, M2, M3, D1, D2 | Complex removable complete prosthodontic appliance construction and modification | You are working in a prosthetics laboratory and have been given a C/C to complete to wax try-in stage. When the try-in returns from the clinic you will take it through to completion/finish. | • Written/practical assignment |
| P5, M4, D3 | Implant and precision attachment systems for removable complete prosthodontic appliances | As a new member of staff you need to be aware of the retention systems that are utilised within a laboratory for removable complete prosthodontics. You will be able to observe fully trained technicians completing these processes. | • Written assignment with images and manufacturers' leaflets |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 2: Medical Emergencies, First Aid and Communication in the Dental Team |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 4: Basic Dental Materials Science |
| Unit 9: Dental Laboratory Compliance |
| Unit 11: Complex Dental Materials Science |
| Unit 15: Advanced Dental Technology Techniques and Procedures |
| Unit 16: Work-based Learning in Dental Technology |

## Essential resources

A dental laboratory with vocationally specific lecturers, a range of dental prosthetic and polymeric materials and specialist fabrication equipment is essential for this unit. Sufficient library resources, ICT facilities, the internet and a range of appropriate journals should be accessible for developing learners' understanding. The specialist technological support groups related to this area may be able to provide additional support and guidance regarding developments in techniques and designs. Benchmark samples are also useful to assist learning and to confirm the specific requirements of the custom-made dental devices.

## Employer engagement and vocational contexts

Where possible, learners should visit private and hospital dental laboratories. This will enable them to obtain a balanced overview of the difference in work acceptance and progression procedures carried out by these differently managed service providers.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE4] Analysing and evaluating information obtained during laboratory visits |
| Creative thinkers | [CT2] Asking questions to extend their understanding of how the more complex systems employed are completed |
| Reflective learners | [RL1, RL4] Self-assessing when completing check sheets after each construction stage; inviting feedback from experienced technical staff during the completion of practical tasks |
| Self-managers | [SM3] Organising their time and resources to complete their practical tasks |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Team workers | [TM5] Taking responsibility for the contribution they are making in the completion of a patient's treatment plan |
| Effective participators | [EP4] Creating complete prosthodontic appliances from prescriptions |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Using the in-house ICT system to find information |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Compiling information, images and transferring into allocated files; reflecting on the finished work and the way it was compiled |
| Manage information storage to enable efficient retrieval | Saving information and assignment work in a folder |
| Follow and understand the need for safety and security practices | Aware of keeping their password safe and not disclosing it to others |
| Troubleshoot | Able to identify a fault and know how to report it |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Collecting information from books, journals, the internet and hand-outs supplied by the tutor |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Obtaining information from identified websites and assessing whether it suits the purpose of the task |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Making sure that the information they require is obtainable from a website, e.g. images of dental appliances and equipment |
| Bring together information to suit content and purpose | Creating a single document that has all the information for their report |
| Present information in ways that are fit for purpose and audience | Presenting the information the way it has been requested in the brief, e.g. written assignments |
| Evaluate the selection and use of ICT tools and facilities used to present information | Discussing how the documents could be improved |

| Skill | When learners are… |
|---|---|
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Using email to send centre-produced work to own address; keeping their messages and replies safe; creating a list of private dental laboratories and hospital contacts; creating a list of suppliers regarding materials |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Discussing construction techniques for the practical tasks |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading hand-outs given during lectures and demonstrations |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing up their assignments |

# Unit 8: Removable Partial Prosthodontics

**Unit reference number:** D/505/9589

**Level:** 3

**Credit value:** 15

**Guided learning hours:** 115

## Unit aim

The aim of this unit is to enable learners to develop their understanding and practical skills in the complex field of removable partial prosthodontics. This will be achieved by tuition on the planning, design and fabrication of removable partial dentures.

## Unit introduction

This unit covers polymeric dentures including the use of acrylic components and polymeric-metallic removable partial prosthodontics (dentures). The long-term suitability of simple tissue borne dentures is considered in relation to tissue damage. Learners should be able to comment on the provision of tissue-borne dentures and design, construct and evaluate simple removable partial dentures.

Learners should be informed of wrought components that can be included in polymeric partial dentures. Learners will learn how to convert wax patterns into metal and polymeric material and use correct finishing techniques on polymeric-metallic materials.

Emphasis is placed on the interpretation of information, the development and application of knowledge, and the development of skills related to partial dentures and the suitability of the appliance for the patient. A substantial period of time may need to be devoted to formal demonstration in this unit as learners progress to preparing and constructing polymeric-metallic removable partial dentures.

On completion of this unit, learners should be able to make appliances to an acceptable standard within a given period of time, as will be necessary in commercial laboratories.

Learners should be encouraged to develop their own operating procedures and COSHH data files relating to all the stages of making removable partial dentures covered in this unit.

## Learning outcomes

**On completion of this unit a learner should:**

1. Know the reasons for the provision of removable partial dentures (RPD)
2. Understand the design requirements and components of partial denture cases
3. Be able to construct simple removable partial dentures in a polymeric material
4. Be able to construct polymeric-metallic removable partial dentures (RPD)

## Unit content

**1 Know the reasons for the provision of removable partial dentures (RPD)**

*Choices when considering partial denture cases*: cost; suitability; oral condition; appearance

*Types of cases*: classification of partial dentures (Kennedy, Beckett); technical terms used in partial denture construction; reasons for and against polymeric partial dentures

*Treatment planning*: reasons for and against the use of partial dentures; prescription requirements and putting patient interests first; effective communication between members of the dental team; personal skills and development

**2 Understand the design requirements and components of partial denture cases**

*Surveying and cast analysis*: reasons for surveying and methods used; Blatterfein Classification of Survey Lines; paths of insertion; undercut depths; component designs relative to survey lines; material selection for components information about periodontal and hard tissue conditions

*Design of partial dentures*: mucosa borne; tooth borne; tooth mucosa borne designs; safe restoration; self-cleansing concept; analysis of function and form; compliance with guidelines and legislation; new technologies affecting design methodology

*Loads applied by dentures in use*: effects of applied forces to tissues and remaining teeth

*Design components*: major connectors; minor connectors; components that provide retention; bracing and support; indirect retention; cast clasps; wrought clasps; supports; palatal, lingual, buccal bars and plates; retention for polymeric components and backings

*Overall designs*: design and components, selection and setting of teeth (Williams Classification)

**3 Be able to construct simple removable partial dentures in a polymeric material**

*Prepare:* selecting appropriate materials; designing and planning construction in correct order; health and safety issues of construction; collecting and arranging documents related to construction of RPDs (operation procedures, COSHH, materials data and component forms)

*Construction*: articulation; surveying; duplication of master cast; selecting components; forming wrought components; setting teeth to obtain correct fit and function; processing and finishing partial dentures to a prepared design using a polymeric base material

*Quality assurance*: checking completed partial dentures against prescription requirements and fitness for purpose; act within professional and ethical standards and expectations

**4 Be able to construct polymeric-metallic removable partial dentures (RPD)**

*Action plan*: planning and designing polymeric/metallic partial denture; organising materials and equipment

*Cast preparation*: articulating models, surveying models; duplicating surveyed casts; using refractory investments; preparing refractory investment cast for use

*Lost wax process*: producing wax patterns (connectors, bracing, retention, support); other parts for use in the lost wax process; investing and wax removal methods; selection and use of partial denture alloys

*Finishing*: metal casting; devesting; trimming; surface finishing; polishing metals; articulation and occlusal relationships; setting artificial teeth; trial denture assessment; processing and finishing using a polymeric base material

*Quality assurance*: quality checks; repairs or modifications; checking complete denture against prescription requirements; act within professional and ethical standards and expectations

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 describe the reasons for the provision of removable partial dentures | | |
| P2 give examples of partial denture cases according to load bearing areas or edentulous spaces [IE1] | M1 discuss the clinical considerations when formulating a partial denture design | |
| P3 discuss the range of common components used in the design and construction of polymeric-metallic partial dentures | M2 justify the use of the components in polymeric and polymeric-metallic partial dentures | D1 evaluate the use of the components in polymeric and polymeric-metallic partial dentures |
| P4 explain the importance of each stage of planning and design of partial dentures | M3 compare the design of partial dentures using practical cases in this unit | D2 critically evaluate different partial denture designs considering oral health, supporting teeth and underlying structures commonly presented by patients |
| P5 explain the processes used to select artificial teeth for partially dentate appliances | | |
| P6 explain the setting of artificial teeth on partially dentate appliances | | |

| Assessment and grading criteria | | | | | |
|---|---|---|---|---|---|
| P7 | survey and duplicate a selection of casts completing all requirements detailed on a prescription [SM2] | M4 | discuss the processes and equipment required to carry out model preparation for partial denture cases | D3 | evaluate the effects of poor and good model preparation techniques on the final product |
| P8 | apply currently used processes to convert wax trial areas of partial dentures into polymeric forms [IE1] | M5 | discuss currently used systems for converting the wax trial areas of partial dentures into polymeric forms | D4 | evaluate systems for converting wax trial areas into polymeric forms |
| P9 | manufacture a simple removable partial denture, completing all construction stages, to include wrought components [RL2] | M6 | compare the processes required to complete the manufacture of partial dentures incorporating acrylic, wrought metal and cast metal components | D5 | critically analyse the appliances produced with suggestions on how to improve the manufacturing process |
| P10 | manufacture a metallic partial denture, completing all construction stages, including polymeric components [RL2] | | | | |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

The use of a dental laboratory is an essential element to the delivery of this unit as a considerable amount of learning time is devoted to the practical development of learners. They will be instructed on the principles of designing and constructing partial dentures using different techniques, equipment and materials. The assessment guidance asks learners to demonstrate the gained knowledge in the form of vocationally centred written reports and practical submissions.

### Delivery

The knowledge and understanding related to this unit is applied to the construction processes of polymeric and polymeric-metallic removable partial dentures (RPDs). Learners will choose and make appropriate components and improve their understanding of removable partial denture design and construction.

Delivery in a dental laboratory will enable an integration of theory and practice teaching methods and will allow learners to apply their knowledge to practical removable partial denture design and construction. The importance of detailed analysis and planning should be emphasised, in order to comply with guidelines. Learners should be able to relate design requirements for components to individual case examples in order to put patient needs first.

Practical demonstrations, videos, and e-learning resources will help learners to apply knowledge to actual cases. The theory and application of surveying will need thorough explanation with demonstration as well as practical work.

Group discussion or presentation of actual cases can be used to help learners understand varied and individual case design requirements.

The importance of meeting professional and ethical standards, and health and safety regulations relating to the use of materials and equipment, must be stressed.

### Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Know the reasons for the provision of removable partial dentures (RPD)* | |
| Introduce the reasons for provision of removable partial dentures (RPD) | 2 |
| Identify treatment planning stages specific to the provision of RPDs | 2 |
| Describe the selection criteria for partial denture cases that put patient needs first | 4 |
| Define the technical terms used in partial denture construction | 4 |
| Personal research and study time | 4 |
| **Assignment 1: Reasons for removable partial prosthodontics** (P1) | 6 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 2** | |
| *Understand the design requirements and components of partial denture cases* | |
| Introduce the classifications related to partial dentures | 2 |
| Demonstrate the classification of partial denture using partially dentate models | 2 |
| Describe surveying and cast analysis and its influence on appliance design | 1 |
| Demonstrate surveying | 2 |
| Discuss paths of insertion and displacement | 2 |
| Evaluate the importance of the health of the oral cavity, the health of the supporting teeth and their underlying structures | 1 |
| Illustrate the different current commonly used partial denture designs including compliance with guidelines and legislation | 7 |
| Explain the effects of applied forces on soft and hard tissues | 2 |
| Assess component design and application and their influence on the overall prognosis of the appliance | 2 |
| Discuss the retention of polymeric components onto metallic base plates | 2 |
| Explain tooth selection and setting of artificial teeth | 2 |
| Personal research and study time | 6 |
| **Assignment 2: Design and construction principles of partial dentures** (P2, P3, P4, P5, P6, M1, M2, M3, D1, D2) | 12 |
| **Learning outcome 3** | |
| *Be able to construct simple removable partial dentures in a polymeric material* | |
| Learners select materials and prepare the working area for the construction stages of partial dentures | 2 |
| Demonstrate health and safety requirements when constructing partial dentures | 1 |
| Demonstrate the design, surveying and duplication stages of construction | 3 |
| Learners survey and duplicate master models | 3 |
| Learners design partial dentures based upon tuition | 2 |
| Learners carry out articulation of master models | 1 |
| Demonstrate component selection and application | 2 |
| Learners apply designs to duplicated models using dental waxes etc. | 6 |
| Demonstrate the setting of teeth in edentulous areas | 1 |
| Learners set teeth to design and occlusion | 2 |
| Demonstrate flasking techniques<br>Learners complete flasking stages<br>Demonstration of devesting, trimming and polishing stages of construction | 2<br>1 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Learners complete the trimming and polishing of their partial dentures | 2 |
| Learners seat dentures to master models and assess occlusal relationship<br>Discuss quality assurance, fitness for purpose and professional standards | 5 |
| **Assignment 3: Manufacturing polymeric partial dentures** (P7, P8, M4, M5, D3, D4) | 5 |
| **Learning outcome 4** | |
| *Be able to construct polymeric-metallic removable partial dentures (RPD)* | |
| Learners select materials and prepare the working area for the construction stages of partial dentures | 1 |
| Revisit design, surveying, duplication and articulation stages of construction | 1 |
| Learners plan and design polymeric/metallic partial denture | 2 |
| Demonstrate the use of refractory investments for the forming of a refractory model and mould | 1 |
| Learners undertake the construction of a refractory model | 2 |
| Learners apply their designs to the models producing a wax pattern | 5 |
| Follow guidelines when carrying out sprue techniques and the lost wax process | 1 |
| Demonstrate investing and wax removal methods | 1 |
| Learners complete patterns and investment stages | 10 |
| Demonstrate casting of alloys into partial denture mould | 1 |
| Demonstrate devesting, trimming and polishing stages | 3 |
| Learners carry out devesting, trimming and polishing stages to the metal base plate | 15 |
| Learners set teeth to the edentulous areas present on the model and process tooth bearing areas with a permanent polymeric material | 3 |
| Learners complete partial denture as in learning outcome 3 | |
| **Assignment 4: Manufacturing polymeric/metallic partial dentures** (P9, P10, M6, D5) | 4 |
| **Total learning time hours** | **153** |

## Assessment

Evidence is collected using assignments and practical work with written or oral examinations.

To achieve a **pass** grade, learners must achieve **all ten** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all six** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all five** distinction criteria as outlined in the grading grid.

For P1, learners are expected to describe the reasons for providing simple removable partial dentures. Evidence could be provided in assignments or examinations.

P2 requires learners to give examples of partial denture cases according to load bearing areas or edentulous spaces using correct terminology. As in P1 this could be covered by assignment or by a written exam using sample casts.

For P3, learners need to explain the use of a range of common components in the design and construction of polymeric-metallic partial dentures. Evidence could be provided in the form of assignments.

For P4, learners must explain the importance of each planning and design stage, including basic design features, of a removable partial denture. Evidence could be in the form of an assignment or booklet.

For P5, learners must explain the processes they would use to select artificial teeth in saddle areas included in a partial denture. This could be covered by an observed practical with a written or oral test or by assignments.

For P6, learners must explain how to set artificial teeth in saddle areas included in a partial denture. This could be covered by an observed practical with a written or oral test or by assignments.

For P7, learners are required to survey and duplicate a selection of casts for the provision of partial dentures. The cases must have opposing dentition or occlude with each other and at least two are required. This section can be evidenced in the form of a practical observation.

P8 requires learners to apply processing procedures to convert wax trial areas into polymeric materials. This could be assessed by the tutor during practical activities or by assignment and presented practical work.

P9 requires learners to manufacture a simple removable partial denture incorporating wrought metal components. This section can be evidenced in the form of a practical observation.

P10 requires learners to manufacture a metallic-polymeric partial denture. This can be assessed using the same method mentioned in P8.

For M1, learners need to discuss the clinical considerations when designing partial dentures. This can be assessed in the same manner as for P2.

For M2, learners must justify the use of the components in polymeric and polymeric-metallic partial dentures. This could be included in the written report for P3.

For M3, learners are required to compare the design of partial dentures using cases issued in the practical element of this unit. Evidence could be in a report format linked to M2.

For M4, learners must discuss the processes and equipment used to carry out model preparation stages for partial denture appliances. Evidence can be provided in the form of a standard operating procedure report.

M5 requires learners to prepare a descriptive report on the current systems used to convert wax trial dentures to polymeric forms, including heat cure, cold cure, auto polymerising, injection moulding and light cured systems. This can be assessed in the form of an assignment.

For M6, learners must compare the technical procedures used to manufacture partial dentures with acrylic, wrought metal and cast metal components. Evidence can be in the form of a written assignment.

For D1, learners must evaluate the use of components in their designs of removable partial dentures. This is best done by assignment or by presentation to other learners.

D2 requires learners to evaluate different partial denture designs with consideration to oral health, supporting teeth and underlying structures. This could be evidenced using the same assessment methods as for D1.

For D3, learners must evaluate the effects of poor and good model preparation techniques on the final product. Evidence could be in the form of a written assignment or examination.

D4 requires learners to evaluate systems for converting wax trial areas into polymeric forms. Learners should evaluate at least two processes and may record their results in the form of an assignment.

For D5, learners are required to critically analyse appliances produced during the unit, with suggested improvements to the manufacturing process. This may be evidenced in the form of a written report or viva voce.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1 | Reasons for removable partial prosthodontics | Your employer is considering opening a prosthetic department in the laboratory where you work. As part of their justification they have asked you to write a report on the reasons partial dentures are selected as part of a treatment plan. | • Written report |
| P2, P3, P4, P5, P6, M1, M2, M3, D1, D2 | Design and construction principles of partial dentures | You have been asked by a dental surgeon to present your understanding of the design and construction stages of partial dentures before they send their removable partial prosthetic work to your laboratory. | Viva voce or oral presentation consisting of:<br>• Surveying<br>• Duplication<br>• Designing appliances<br>• Components<br>• Processing methods |

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P7, P8, M4, M5, D3, D4 | Manufacturing polymeric partial dentures | Your work-based mentor has asked you to construct a polymeric partial denture as part of a staff appraisal process. You will carry out all of the practical elements of this task and be assessed on the amount of guidance you require to produce an appliance of an acceptable standard | Practical submission to include:<br>• articulation<br>• surveying<br>• duplication<br>• design concepts<br>• processing |
| P9, P10, M6, D5 | Manufacturing polymeric/metallic partial dentures | Your work-based mentor has asked you to construct a metallic-polymeric partial denture as part of a staff appraisal process. You will carry out all of the practical elements of this task and be assessed on the amount of guidance you require to produce an appliance of an acceptable standard. | Practical submission to include:<br>• as above<br>• metal casting<br>• metal processing<br>• acrylic stages |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 4: Basic Dental Materials Science |
| Unit 7: Removable Complete Prosthodontics |
| Unit 9: Dental Laboratory Compliance |
| Unit 11: Complex Dental Materials Science |
| Unit 15: Advanced Dental Technology Techniques and Procedures |
| Unit 16: Work-based Learning in Dental Technology |

## Essential resources

Specialist lecturers and a training dental laboratory, with a range of dental metal alloys both cast and wrought and polymeric materials, and specialist fabrication equipment, are essential for this unit.

Learners also need access to library resources, e-learning applications, the internet, and a range of appropriate journals.

Specialist support groups related to dental technology may be able to provide additional support and guidance on developments in techniques and designs. Benchmark samples, particularly those showing stages of construction, are useful to assist learning and to show the specific requirements of removable partial dentures that learners will make.

## Employer engagement and vocational contexts

Work placements in a dental laboratory will help learners understand the detail in this unit and enable them to develop their practical skills and gain knowledge from an alternative prospective. Employers could provide additional training support in the form of seminars and lectures.

External supply companies should be encouraged to deliver sessions on, for example, material selection or design of partial dentures.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE1] Describing different types of partial dentures based upon load bearing areas using the correct terminology |
| Reflective learners | [RL2] Setting goals and time managing practical partial denture projects. |
| Self-managers | [SM2] Working towards personal goals during the surveying of cast models |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE2] Investigating partial design concepts in relation to prescription requirements and the oral health of the patient |
| Creative thinkers | [CT5] Exploring different design concepts for partial denture cases; selecting best designs based upon gained knowledge in this unit and constructing appliances |
| Reflective learners | [RL4] Demonstrating design ideas to peers and allowing them to analyse the appliance and give feedback<br>[RL5] Evaluating partial denture design concepts to forward their understanding and progression |
| Team workers | [TW1] Actively taking part in small group activities |
| Self-managers | [SM3] Carrying out assignment work and personal study |
| Effective participators | [EP4] Evaluating their finished practical projects |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Using the internet for research; recording data; word processing documents to meet the requirements of assignments; selecting resources for oral presentations |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | |
| Manage information storage to enable efficient retrieval | Storing information gathered during assignment research |
| Follow and understand the need for safety and security practices | Correctly using computers free from food and drink; only using their own logins etc.; conforming to professional standards and data protection when using patient sensitive material |
| Troubleshoot | Spell checking assignments |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Using the internet or other media to help design their partial dentures |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Searching for different components that can be used in partial dentures appliances |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Taking photos of their practical projects to present in their assignments; keeping records of techniques used |
| Bring together information to suit content and purpose | Collating information to use for an assignment |
| Present information in ways that are fit for purpose and audience | Meeting presentation requirements of assignment briefs |

| Skill | When learners are… |
|---|---|
| Evaluate the selection and use of ICT tools and facilities used to present information | |
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Taking part in internet chat rooms designed to assist in their studies |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | Using materials that require measurements and the use of ratios |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | Calculating multiple mixing measurements and ratios for larger practical tasks; using burn-out furnaces that have temperature settings |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |

| **English** | |
|---|---|
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Taking part in group discussions relating to the reasons for partial dentures appliances; interacting with external speakers, dental team members and patients |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Comparing different denture design concepts on the internet, in books and hand-outs |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Completing their assignments |

# Unit 9: Dental Laboratory Compliance

**Unit reference number:** R/505/9590

**Level:** 3

**Credit value:** 10

**Guided learning hours:** 70

## Unit Aim

The aim of this unit is to develop learners' understanding of the legislation, requirements and demands that are placed on all dental laboratories to ensure the rights and safety of the patient and the public. It also enables learners to understand the laws and standards that apply to all dental laboratories in the running of their business.

## Unit introduction

The treatment of patients and the construction of dental appliances is governed by legislation and regulated by the General Dental Council. This legislation is in place to ensure the health and safety of the patient, dental technician and the public.

Learning outcome 1 gives learners an understanding of the cross-infection controls that are in place to ensure the safety of the patient, the dental team and the public. The unit covers the procedures undertaken and relevant micro-organisms and blood-borne pathogens.

Learning outcome 2 looks at the concept of quality assurance, its development and application within dental technology, and how it enables laboratories to provide customers with quality products that are consistent and constructed in a safe and appropriate manner.

Learning outcome 3 gives learners an understanding of how customer complaints are handled. The unit covers the procedures and best practices that help dental laboratories work towards patient protection, and promote confidence in dental professionals.

Learning outcome 4 gives learners an understanding of keeping health and safety records and schedules for the maintenance of dental laboratory equipment and materials in order to safeguard staff, the public and patients.

Learning outcome 5 gives learners an understanding of legislation relating to disposal of waste, including unwanted equipment, and excess and used materials, from dental laboratories. It challenges learners to think about the potential environmental and legal consequences of not adhering to guidelines.

## Learning outcomes

### On completion of this unit a learner should:

1. Understand the cross-infection control protocols required in a dental laboratory
2. Understand the current quality assurance legislation and standards that influence dental laboratories
3. Understand the principles of complaints handling in the dental laboratory environment
4. Understand how to keep and maintain health and safety records in the dental laboratory environment
5. Understand the legislation relating to disposal of waste from dental laboratories

## Unit content

**1 Understand the cross-infection control protocols required in a dental laboratory**

*In-house dental laboratory policies*: cross-infection control and current legislation; identifying risks; which bacteria and blood-borne pathogens put patients and dental team at most risk

*Good housekeeping*: personal protective equipment (disposable gloves, utility gloves, face masks, protective eye wear, laboratory coats); Hepatitis B immunisation; sending and receipt of items

*Cleaning and disinfection*: air ventilation and extraction systems; equipment and instruments; floors and surfaces; biohazard labels/symbols; training programmes; barrier creams; antiseptic hand washing; disinfection methods applied; sterilisation methods for protection against blood-borne pathogens and bacterial infections

**2 Understand the current quality assurance legislation and standards that influence dental laboratories**

*Importance of quality assurance*: customer satisfaction and safety; consistency of products; personal safety and liability; appraisal and feedback

*Current legislation*: Medicines and Healthcare products Regulatory Agency (MHRA); General Data Protection Regulation (GDPR) and Personal Protective Equipment (PPE) legislation

*Current standards*: International Organisation for Standardisation 9000 (ISO 9000); Dental and Manufacturing Audit Scheme (DAMAS)

*Quality manual*: work in accordance with a quality manual

*Scope*: standardised procedures; material selection and supply; quality planning; contract review; document and data control; product identification and traceability; the importance of maintaining and protecting patient confidentiality and records

*Internal auditing*: the need for internal auditing; basic internal auditing in the dental laboratory; review of updates regarding legislation

**3 Understand the principles of complaints handling in the dental laboratory environment**

*Effective handling of complaints*: organisational policies and procedures; ensure patient care is appropriate; recognition of complaints and respecting patients' right to complain, service level agreements/patients charter, Care Quality Commission and GDC Standards Guidance and principles of complaints handling; recognise the importance of candour and effective communication with patient, knowing how and where to report any patient safety issues that arise

*Process of handling complaints*: analysis of evidence, timeframes, communication updates and fair solutions

*Dental defence organisations*: support in complaints handling and standards, investigation and learning from complaints

**4 Understand how to keep and maintain health and safety records in the dental laboratory environment**

*Maintenance schedules for protective equipment*: dust and fumes; ventilation within the working environment; maintenance of LEVs and filters

*Health and safety legislation*: legal requirements; codes of practice and enforcement

*Control of Substances Hazardous to Health Regulations (COSHH) 2002:* stages of risk assessment; standard operating procedures; identifying hazards; risk evaluation; control measures; risk assessment review; PAT testing; Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)

*Personal responsibility:* recognise, take responsibility for and act to raise concerns about your own or others' health, behaviour or professional performance as described in GDC Standards; patient records

**5 Understand the legislation relating to disposal of waste from dental laboratories**

*Environmental and disposal of waste legislation:* environmental waste regulation; disposal of excess or used materials; care of the environment; water and sewage regulations; household and industrial waste control; the importance of how we regulate the production, re-use, recycling, recovery and disposal of waste in order to protect human health and the environment

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 explain the key principles of cross-infection control in the dental laboratory environment | | |
| P2 explain the application of effective cross-infection control protocols in the dental laboratory environment | M1 compare the effectiveness of different cross-infection control protocols and aseptic techniques in the dental laboratory environment | D1 evaluate the effectiveness of cross-infection control procedures and policies in the dental laboratory environment |
| P3 assess the current quality assurance legislation and standards that are required to operate a dental laboratory within the law [IE2] | M2 discuss processes in a dental laboratory where quality assurance can be applied [RL5] | D2 evaluate how quality management, quality control and quality assurance have proved beneficial to a dental laboratory |
| P4 explain the importance of following procedures for maintaining quality assurance records in the dental laboratory [IE4] | M3 justify the procedures for tracking products throughout their manufacturing process in a dental laboratory | |
| P5 discuss the principles that underpin the process of handling complaints | | |
| P6 explain dental laboratory procedures for handling complaints [RL5] | M4 discuss the possible consequences of not following complaints handling procedures | D3 evaluate the effectiveness of complaints handling procedures in the dental laboratory |

| Assessment and grading criteria | | | | | |
|---|---|---|---|---|---|
| P7 | explain the procedures for maintaining health and safety records in the dental laboratory [IE3, CT5, EP1] | M5 | assess the health and safety legislation that applies to record keeping within a dental laboratory | D4 | evaluate the effectiveness of the procedures for maintaining health and safety records in the dental laboratory |
| P8 | explain the implications of legislation regarding the safe disposal of excess materials and waste on the environment to dental laboratories | | | | |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

The delivery of this unit should be designed to stimulate the learner using a wide range of media to include formal lectures, discussions, Q&A sessions, activities and the use of ICT facilities and the internet.

## Delivery

The purpose of this unit is to develop understanding of the laws, regulations, standards and personal responsibility that apply to the manufacture of dental devices and the impact they have when applied to the dental laboratory. The unit covers the protocols implemented in a dental laboratory to ensure the health and safety of the patient, the dental team and the public.

Learning outcome 1 could be delivered through formal lectures, question and answer sessions, discussion, research and role-play scenarios. Delivery should cover identification of risks and the safeguards that are in place to prevent cross-infection in a dental laboratory.

Learning outcome 2 could be delivered through formal lectures, demonstrations, discussions, work placements and independent learner research. Learners need to understand how to interpret the laws and standards that apply to all dental laboratories, including the guidance on the GDC website.

Visits to a working dental laboratory environment will enable learners to see how quality systems are applied.

Learning outcome 3 could be delivered through formal lectures, activities, question and answer sessions, discussions, research and role-play scenarios. Learners should study GDC guidelines on the principles of complaints handling in their standards guidance booklet. This learning outcome links to the communications part of Unit 2.

Learning outcome 4 could be delivered through formal lectures, activities, question and answer sessions, discussions and research into the legislation that applies to keeping records, material selection and staff training.

Learning outcome 5 could be delivered as formal lectures, activities, question and answer sessions, discussions and research into the legislation that applies to the safe disposal of excess materials and waste.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Introduction to the unit and structure of the programme of assignments | 2 |
| **Learning outcome 1** | |
| *Understand the cross-infection control protocols required in a dental laboratory* | |
| Introduction to cross-infection procedures | 3 |
| Discussion with role play on how infection is transmitted | 2 |
| Recognise and discuss the importance of public and dental team safety | 2 |
| Practise applying cross-infection control procedures when receiving and returning impressions | 3 |
| Learners to carry out research into the basic principles of cross-infection control | 3 |
| Learners research the effectiveness of cross-infection control | 3 |
| **Assignment 1: Cross-infection control within a dental laboratory** (P1, P2, M1, D1) | 4 |
| **Learning outcome 2** | |
| *Understand the current quality assurance legislation and standards that influence dental laboratories* | |
| Consider current quality assurance legislation and its application to a dental environment | 3 |
| Look into the current standards and the International Standards Organisation (ISO9000) | 2 |
| Explain the voluntary scheme known as the Dental and Manufacturing Audit Scheme (DAMAS) and how it can be beneficial in a dental laboratory | 3 |
| Discuss standard procedures, material selection and supply | 2 |
| Discuss product traceability and tracking | 3 |
| Evaluate a basic internal audit ensuring patient confidentiality is maintained | 4 |
| **Assignment 2: Quality assurance in a dental laboratory** (P3, P4, M2, M3, D2) | 4 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 3** | |
| *Understand the principles of complaints handling in the dental laboratory environment* | |
| Introduction to complaints handling and patient rights | 2 |
| Discussion, with role play, on how to deal with a complaint | 3 |
| Respecting the patient's right to complain | 3 |
| Learning from complaints, complaints handling and ensuring candour | 3 |
| Research dental defence organisations | 3 |
| Discuss the importance of professional indemnity insurance | 2 |
| Research and document case studies | 3 |
| **Assignment 3: Principles of complaints handling** (P5, P6, M4, D3) | 4 |
| **Learning outcome 4** | |
| *Understand how to keep and maintain health and safety records in the dental laboratory environment* | |
| Discussion on the keeping and maintaining of records, and the principles of personal responsibility | 3 |
| How to store these records | 2 |
| What records to keep | 2 |
| Research the regulations regarding equipment maintenance | 3 |
| Discussion on maintenance schedules | 2 |
| Research regulatory bodies for maintenance of equipment | 2 |
| **Assignment 4: Health and safety record keeping** (P7, M5, D4) | 4 |
| **Learning outcome 5** | |
| *Understand the legislation relating to disposal of waste from dental laboratories* | |
| Introduction to safe disposal of materials and equipment | 2 |
| Legislation regarding the safe disposal of excess materials and waste | 3 |
| Discussion on the safe disposal of equipment | 2 |
| Discussion on the safe disposal of excess materials and waste and the environmental impact of dental waste | 3 |
| Legal requirements and consequences | 2 |
| **Assignment 5: Legislation relating to disposal of waste** (P8) | 4 |
| **Total learning time hours** | **100** |

## Assessment

To achieve a pass grade for the unit learners will need to follow an investigative process and record information with some accuracy. They will need to use correct terminology and be able to identify problems and errors.

To achieve a **pass** grade, learners must achieve **all eight** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all five** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all four** distinction criteria as outlined in the grading grid.

For P1, learners will be expected to explain the key principles of cross-infection control. Evidence of this could take the form of a flow chart or pictorial presentation with explanatory notes to form a poster or leaflet.

For P2, learners must explain how cross-infection protocols are administered in the dental laboratory environment. They will explore which techniques are suitable for each material received. Evidence could be in the form of a written report or an oral presentation.

For P3, learners are required to assess the current quality assurance legislation and standards, including the Medical Devices Regulation (MDR), General Data Protection Regulation (GDPR) 2018 and legislation for personal protective equipment. Evidence could be in the form of a written report or an oral presentation.

For P4, learners must explain the importance of following procedures for maintaining quality assurance records in the dental laboratory. This could be evidenced in the form of a written report or a presentation using relevant ICT.

For P5, learners are required to discuss the principles that underpin complaints handling. This will include legislation, regulations, GDC and organisational codes of practice and patient charters. Evidence could be in the form of a written report, flow chart or poster.

For P6, learners will be expected to explain how to handle complaints, discuss complaints procedures, and identify support. Learners should consider the principles in P5 and should have an awareness of the organisational procedures that a dental laboratory may put in place to support these principles. Evidence could be in the form of a written report, flow chart or poster.

For P7, learners are required to explain the procedures for maintaining health and safety records required by law in a dental laboratory. Evidence could be in the form of a written report or poster.

For P8, learners will need to explain the implications of not following the health and safety guidelines for the safe disposal of dental waste. Learners should consider the potential impacts of this on the laboratory and the environment. Evidence could be in the form of a written report, flow chart or poster.

Merit grade learners will be able to investigate and research and will be able to plan in more depth. They will identify some problems without prompting and be able to offer some solutions independently. Merit grade learners' work will be accurate and detailed from a description standpoint, but in addition it will offer some discussion, explanation and reasoning.

For M1, learners are expected to compare the effectiveness of different cross-infection control procedures in a dental laboratory environment, explaining why protocols are in place and what may happen if these protocols are not adhered to. Evidence may be in the form of a written report, flow chart or poster.

For M2, learners must discuss processes in the dental laboratory where quality assurance could be applied and whether these processes could be improved. Evidence could be provided in a written report or presentation.

For M3, learners need to explain traceability, justifying the procedures used to ensure that work is tracked throughout production and that appropriate data can be retrieved for audit purposes. Evidence could be in the form of a written report or poster.

For M4, learners will be expected to discuss the possible consequences of not following complaints handling procedures. Evidence could be in the form of a written report or poster.

For M5, learners will be expected to assess the health and safety legislation that applies to record keeping within a dental laboratory. They need to understand review schedules, which records are kept, how long they are kept for and who may ask to see them.

Distinction grade learners will access and use a wide range of resources and be able to research material. Their practical work will recognise the difficulties of recording information and look for alternative methods. There will be a tendency towards summative work and conclusions, plus an ability to see several sides to a discussion, problem or debate. Distinction level work will be accurate and detailed, as well as offering in-depth explanations and, where appropriate, evaluation or assessment.

For D1, learners will be expected to evaluate the effectiveness of cross-infection control procedures and policies, and look into ways of improving them. Evidence could be in the form of a written report or an information leaflet.

For D2, learners need to look at the history of quality assurance and evaluate how quality management, quality control and quality assurance have proved beneficial to a dental laboratory, including the effect on business success. Evidence could be in the form of a written report.

For D3, learners will be expected to look at case studies of complaints, evaluate the effectiveness of complaints handling and identify areas for improvement. Evidence could be in the form of a written report.

For D4, learners must evaluate the effectiveness of the procedures for maintaining health and safety records in the dental laboratory. They will need to consider the strengths and weaknesses of current procedures, and suggest implications and alternative procedures where appropriate. Evidence could be in the form of a written report.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, P2, M1, D1 | Cross-infection control within a dental laboratory | You have been asked by the laboratory owner to provide an up-to-date review on the laboratory's cross-infection control procedures in order to comply with the latest regulations. Your report should identify the risks and the safeguards that should be in place to reduce risks to the dental team and the public. | • Assignment using hand-outs, information technology, and copies of the current legislation |
| P3, P4, M2, M3, D2 | Quality assurance in a dental laboratory | Your employer, the owner of a dental laboratory, has asked you to write a report about the legal responsibility dental laboratories undertake in order to comply with quality assurance standards. Your report should include systems available to track and monitor procedures in the dental laboratory.<br>Your report should include all relevant current quality assurance legislation and standards that are required to operate a dental laboratory and should explain how a quality assurance system is put into practice in a dental laboratory, including any improvements that could be made. | • Assignment using hand-outs, information technology, and copies of the current legislation |

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P5, P6, M4, D3 | Principles of complaints handling | Your employer has asked you to create a complaints procedure manual for the dental laboratory, in order to sort out any complaints as quickly, effectively and smoothly as possible. Your research should identify a framework, setting times and responsibilities for complaints handling and ensuring that GDC principles are followed. | • Assignment using hand-outs, information technology, and copies of the current guidelines |
| P7, M5, D4 | Health and safety record keeping | You have been asked by your employer to write a report on which records should be retained and for how long, and to create a schedule for maintenance and servicing. The report should review the current health and safety legislation applicable to record keeping, evaluating the effectiveness of the current procedures in a dental laboratory setting and ensuring that the principles of personal responsibility are adhered to. | • Assignment using hand-outs, information technology, and copies of the current guidelines |
| P8 | Legislation relating to disposal of waste | You have been asked by your employer to write a report on the current legislation regarding the safe disposal of excess materials and waste, and its implications to the dental laboratory. | • Assignment using hand-outs, information technology, and copies of the current guidelines |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 2: Medical Emergencies, First Aid and Communication in the Dental Team |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 5: Legislation, Professionalism and Ethics in Dentistry |

## Essential resources

Learners need access to a PC for internet-based research, relevant audio/visual presentations, laboratory quality manuals, a dental laboratory, and a library with journals and research facilities.

Staff delivering this unit should be competent and experienced in the dental laboratory environment and it is highly desirable that they should have knowledge of the current laws and standards that impact on dental technology.

## Employer engagement and vocational contexts

It is essential for the success of the unit that employers actively involve learners in their cross-infection controls, complaints procedures and quality systems within the laboratory. Learners need to be shown a working model to fully understand how cross-infection controls, complaints procedures and quality systems are integrated into everyday life in a modern dental laboratory.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE2] Explaining how quality assurance has evolved in the dental laboratory<br>[IE4] Explaining the importance of following procedures and maintaining records in the dental laboratory<br>[IE3] Explaining the procedures for maintaining health and safety records in the dental laboratory<br>[IE2] Evaluating the effectiveness of the procedures for maintaining health and safety records in the dental laboratory |
| Creative thinkers | [CT2] Listing current quality assurance legislation and standards<br>[CT5] Demonstrating how to keep records and audit trails for the benefit of the dental laboratory |
| Reflective learners | [RL5] Explaining how quality assurance has evolved in the dental laboratory; evaluating the effectiveness of complaints handling procedures in the dental laboratory |
| Effective participators | [EP1] Demonstrating how to keep records and audit trails for the benefit of the dental laboratory |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Searching the internet; word processing documents to meet the requirements of the assignment |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | |
| Manage information storage to enable efficient retrieval | Saving information in suitable files in suitable folders (memory stick) |
| Follow and understand the need for safety and security practices | Keeping food and drink away from computers; not using someone else's login; explaining how safety is addressed in the context of the tasks; explaining why the IT usage policy forbids certain actions |
| Troubleshoot | Carrying out checks to identify the source of a problem encountered, e.g. missing a particular file of work |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Using data from the internet, books, supplied by the tutor |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Evaluating whether the data collected meets the requirements of the assignment task |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Collating data from legislation and writing about the relevance to dental laboratories; taking digital photographs and uploading these into suitable files; saving images for use in assignments; keeping records for audit use |
| Bring together information to suit content and purpose | Collecting information in one file for editing into a suitable format |
| Present information in ways that are fit for purpose and audience | Presenting information in the formats required for the assignment briefs |

| Skill | When learners are… |
|---|---|
| Evaluate the selection and use of ICT tools and facilities used to present information | Evaluating whether the presented data is appropriate in accordance with the grading criteria |
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Sending emails to tutors with appropriate information attached; demonstrating to tutors that email has been used appropriately; responding to feedback on assignments |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | Looking at audit trails that include mathematical data |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Taking part in class discussions about how trends may be described; interacting with external, industrial speakers |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading and comparing information from text and tables; using persuasive language in writing an article about quality assurance in dental laboratories |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing reports, articles and notes that are required to complete the assignment briefs |

# Unit 10: Design of Fixed Prosthodontics

**Unit reference number:** Y/505/9591

**Level:** 3

**Credit value:** 10

**Guided learning hours:** 70

## Unit Aim

The aim of this unit is to enable learners to understand the principles and requirements of treatment planning along with the design principles for single-unit and multi-unit restorations. It also explores the systems available for producing all-ceramic restorations and reasons for the provision of temporary restorations and diagnostic wax ups.

## Unit introduction

This unit focuses on the design of fixed prosthodontics. This area of dental technology is increasingly popular and constantly changing.

Learning outcome 1 introduces learners to the necessity of treatment planning for fixed prosthodontics, to ensure the best treatment for the patient, and gives them an insight into the types of tooth preparation done clinically by the dentist. Learners will begin to understand design requirements for single-unit restorations and become aware of the varying sub and superstructure combinations. They will also learn about the advantages and limitations of these types of restoration.

Learning outcome 2 covers dental bridge design showing progression from single-unit to multi-unit restorations. Learners will look at different types of dental bridge design and component parts currently used. They will learn how each component part is vital to ensuring a viable bridge design.

All-ceramic restorations provide strength and excellent aesthetics and are increasingly popular with patients and dentists. For learning outcome 3 learners will gain an understanding of the types of all-ceramic restoration systems and the advantages and disadvantages of each.

For learning outcome 4 learners will discover the reasons for providing temporary restorations and the design requirements of these. They will also learn the reasons for the design features of temporary restorations.

Finally, for learning outcome 5 learners will look at why diagnostic wax ups are used in the treatment planning process for patients.

## Learning outcomes

### On completion of this unit a learner should:

1. Understand design requirements for single-unit restorations
2. Understand the principles of design for multi-unit restorations
3. Understand the types of all-ceramic restoration commonly used
4. Understand the reasons for the provision of temporary restorations
5. Understand the reasons for the provision of diagnostic wax ups in treatment planning for patients

## Unit content

**1 Understand design requirements for single-unit restorations**

*Treatment planning:* patient examination; radiographs to check bone loss, periodontal tissue and tooth state; team discussions; prescription requirements and developing techniques and technology; advantages and limitations of fixed prosthodontic treatment; stages of treatment planning and time management; stabilisation etc.

*Substructure designs*: types of substructure; substructure design faults; clinical tooth preparations; bonding methods; choice of material, alloy, ceramic, zirconia; indications and limitations of metallic substructures

*Aesthetic bonded superstructure design*: material selection, e.g. ceramic and composite; anatomical shaping; space requirement; aesthetic consideration; function and limitations; shade taking; understanding the science of light and colour

*Metallic restorations:* wax pattern design, e.g. coronal shape, contact areas, emergence profile, occlusal harmony; choice of alloy

*Non-metallic restorations:* composite, glass ceramic, zirconia

**2 Understand the principles of design for multi-unit restorations**

*Treatment planning:* patient examination; radiographs to check bone loss, periodontal tissue and tooth state; team discussions; prescription requirements

*Design principles:* major dental bridge forms; components; indications and limitations of each bridge type and how other restorations could be used, e.g. dentures and implants

*Retainers:* types; functions; aesthetically acceptable; cements

*Connectors:* types of connector; function; positioning; precision attachments

*Pontics:* types of pontic; design requirements; functions; material selection

**3 Understand the types of all-ceramic restoration commonly used**

*All-ceramic crown systems:* currently available systems; constituents; advantages and disadvantages of each system; types of restorations, e.g. full crowns, bridges, inlays; current computer aided design and computer aided manufacture systems (cad/cam), pressing, wax printing, milling

**4 Understand the reasons for the provision of temporary restorations**

*Temporary restorations:* types; reasons for their use; design features, e.g. easily cleaned to maintain a healthy oral environment, space maintenance, good contact points; function, e.g. prevent tooth movement, aesthetics; material selection, e.g. acrylic: milled, self-cured, modification of stock teeth

**5 Understand the reasons for the provision of diagnostic wax ups in treatment planning for patients**

*Diagnostic wax ups:* reasons for their use during patient treatment planning; re-alignment and design criteria

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a pass grade the evidence must show that the learner is able to:** |
| P1 explain the stages of treatment planning, prior to treatment commencing, in fixed prosthodontic treatment [IE4] | M1 discuss the duties of the dental team in relation to the provision of fixed prosthodontics | D1 evaluate the advantages and limitations of fixed prosthodontic treatment |
| P2 describe the types of single-unit restorations available, including all-metallic [IE4] | | |
| P3 assess the characteristics of materials that are recommended to be used for single-unit superstructures [IE4] | M2 justify the importance of the ceramic metal junction and clinical tooth preparation design | D2 discuss how the overall design of the restoration affects the aesthetics and function |
| P4 explain the techniques used for taking the shade of a patient's tooth using a shade guide [IE1] | M3 discuss how light and colour can have an effect on the choices of shade of a patient's dentition | |
| P5 explain the major dental bridge design systems and components [IE4] | M4 justify the indications and contra-indications of each dental bridge design | |
| P6 discuss the current systems for all-ceramic restorations [IE4] | M5 compare the present CAD/CAM systems available for all-ceramic restorations | D3 evaluate the cost effectiveness of CAD/CAM systems in the dental laboratory |

| Assessment and grading criteria | | | | | |
|---|---|---|---|---|---|
| P7 | explain the use of temporary restorations, giving reasons for their design features [IE1] | M6 | compare the materials and techniques that could be used to construct temporary restorations | D4 | evaluate the importance of temporary restorations to the overall treatment plan of the patient |
| P8 | explain the provision of diagnostic wax ups in the treatment planning for patients [IE1] | M7 | justify the importance of aesthetics in the production of diagnostic wax ups | D5 | evaluate the importance of diagnostic wax ups to the overall treatment plan of the patient |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

The delivery of this unit should be designed to stimulate the learner using a wide range of media to include formal lectures, discussions, Q&A sessions, practical activities and the use of ICT facilities. Site visits from subject specialists are recommended. Assessment may take the form of practical simulation, viva voce, summative examination and independent research in the form of written assignments.

## Delivery

The learning outcomes for this unit provide learners with knowledge of the design requirements for fixed prosthodontic appliances. They also provide the underpinning knowledge necessary for the production of fixed prosthodontics. Delivery could be in the form of lectures, demonstrations, discussions, seminar presentations, research using the internet and/or library resources and the use of personal and laboratory experience. It is important to keep learners motivated by providing variety in the delivery methods.

Whichever delivery methods are used, it is essential that tutors stress the importance of patient welfare, dental teamwork and the importance of accuracy and quality when designing fixed prosthodontics.

Learning outcomes 1 and 2 are directly linked. These are likely to be delivered by formal lectures, demonstrations, discussions and independent learner research. Learners will discover the design requirements and treatment planning for the provision of single-unit restorations and metal substructures and the reasons for using each restoration and metallic substructure. Visiting expert speakers could add to the relevance of the subject for learners, for example, by talking about their work, materials and design methods, and giving demonstrations.

Learning outcome 3 covers all-ceramic systems and the differences between them. Delivery could be linked to the delivery of learning outcomes 1 and 2 and include formal lectures, discussions and demonstrations. Health and safety issues and patient welfare must be addressed whilst designing the restorations. Visiting expert speakers could add to the relevance of the subject for learners. For example, an expert ceramist could demonstrate and discuss developments in all-ceramic restoration, or dental supplies companies could demonstrate their particular CAD/CAM system. Learners could also visit external laboratories that construct these restorations.

For learning outcome 4, learners will look at types of temporary restorations and why they are used. Different materials and design features should be covered with advantages and disadvantages of each. Delivery techniques should be varied and could include formal lectures, demonstrations and independent student research. Health and safety issues and patient welfare must be addressed whilst designing the restorations. Visiting expert speakers could add to the relevance of the subject for learners. For example, sales representatives could demonstrate new advanced materials, techniques and equipment.

Learning outcome 5 covers the provision of diagnostic wax ups and their role in communication between the patient and the dental team. Delivery techniques should be varied and could include formal lectures, demonstrations and independent learner research. Health and safety issues and patient welfare must be addressed whilst designing wax ups. Visiting expert speakers could add to the relevance of the subject for learners, for example, sales representatives could demonstrate new advanced materials, techniques and equipment.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Understand design requirements for single-unit restorations* | |
| Describe treatment planning | 2 |
| Discuss prescription requirements and learners create their own | 2 |
| Discuss advantages and limitations of fixed prosthodontic treatment | 2 |
| Describe types of substructure | 2 |
| Describe substructure design faults | 2 |
| Discuss clinical tooth preparations | 2 |
| Describe bonding methods | 2 |
| Describe choice of alloy | 2 |
| Discuss aesthetics, ICT case studies | 2 |
| Discuss anatomical shaping and space requirement | 2 |
| Describe design principles | 1 |
| Discuss shade taking principles | 2 |
| Learners practise shade taking | 2 |
| **Assignment 1: Treatment planning** (P1, M1, D1) | 4 |
| **Assignment 2: Describe the design and manufacture of single-unit restorations** (P2, P3, P4, M2, M3, D2) | 4 |
| **Learning outcome 2** | |
| *Understand the principles of design for multi-unit restorations* | |
| Describe treatment planning | 2 |
| Discuss design principles | 2 |
| Describe bridge components | 2 |
| Discuss retainer types | 2 |
| Discuss bridge functions | 2 |
| Discuss aesthetics | 2 |
| Describe connectors | 2 |
| Discuss precision attachments | 2 |
| Discuss pontics design | 2 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Describe material selection | 2 |
| **Assignment 3: Dental bridge design** (P5, M4) | 4 |
| **Learning outcome 3** | |
| *Understand the types of all-ceramic restoration commonly used* | |
| Discuss currently available systems | 4 |
| Describe constituents | 2 |
| Discuss advantages and disadvantages of each system | 3 |
| Discuss types of restorations | 3 |
| Explore the current CAD/CAM systems and techniques available for the manufacture of all-ceramic restorations. | 4 |
| **Assignment 4: All-ceramic systems** (P6, M5, D3) | 4 |
| **Learning outcome 4** | |
| *Understand the reasons for the provision of temporary restorations* | |
| Discuss reasons for their use | 2 |
| Describe design features | 2 |
| Discuss materials | 2 |
| Discuss advantages and disadvantages for each material type | 2 |
| **Assignment 5: Principles of temporary restorations** (P7, M6, D4) | 4 |
| **Learning outcome 5** | |
| *Understand the reasons for the provision of diagnostic wax ups in the treatment planning for patients* | |
| Describe reasons for their use during treatment planning | 2 |
| Discuss design features | 2 |
| Describe anatomical shaping – space requirement | 2 |
| Discuss aesthetics | 1 |
| **Assignment 6: The provision of diagnostic wax ups** (P8, M7, D5) | 4 |
| **Total learning time hours** | **100** |

## Assessment

To achieve a **pass** grade, learners must achieve **all eight** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all seven** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all five** distinction criteria as outlined in the grading grid.

For P1, learners will be expected to explain the stages of treatment planning prior to treatment commencing for fixed prosthodontic restorations and explain the importance to the final outcome. Learners will be expected to explain why the designs for metallic substructures, aesthetic substructures and metallic restorations are important. Evidence for this could take the form of a pictorial presentation with an explanation (possibly using ICT), a report with diagrams, an annotated poster or leaflet.

For P2, learners must describe the types of single-unit restorations available, identifying the different substructure designs. Evidence may be in the same format as for P1. It could also be linked to assessment for P3.

For P3, learners must assess the characteristics of materials that are recommended to be used for single-unit superstructures. Evidence may be in the same format as for P1. It could also be linked to assessment for P2.

For P4, learners must explain the techniques used for taking the shade of a patient's tooth using a shade guide. Evidence may be in the same format as for P1.

For P5, learners must explain the component parts of dental bridge systems, describing the different pontic and connector designs. Learners will be expected to include the materials that can be used. Evidence may be in the same format as for P1. It could also be linked to assessment for P4.

For P6, learners must discuss the current systems for all-ceramic restorations, including CAD/CAM, listing the types of restorations that can be constructed by this method. Evidence may be in the same format as for P1. It could also be linked to assessment for P2.

For P7, learners must explain the use of temporary restorations, giving reasons for their design features. Learners will be expected to cover a range of reasons for their use, design features and functions. Evidence may be in the same format as for P1.

For P8, learners must explain the uses of diagnostic wax ups and the reasons for their design features. Learners will be expected to cover a range of reasons for their use, design features and functions. Evidence may be in the same format as for P1.

For M1, learners are required to discuss the duties of each member of the dental team in relation to the provision of fixed prosthodontics and list the prescription requirements expected for the provision of a single-unit restoration. This can be directly linked to work undertaken in P1. Evidence may be in the same format as for P1.

M2 requires learners to justify the importance of the metal ceramic junction and clinical tooth preparation design. Learners must give examples of where the metal ceramic junction should be positioned for a number of different cases and what restorations can be used on the different tooth preparations. This can be directly linked to work undertaken for P3. Evidence may be in the same format as for P1.

For M3 learners must discuss how the light and surroundings can affect the shade of a patient's dentition during the shade taking process and explain measures that can be implemented to prevent error. Evidence may be in the same format as for P1.

For M4, learners must explain the importance of pontic and connector positioning, design, justifying the indications and contra-indications of each design. Learners must give examples of where each pontic and connector design is most suited and explain what they do and also the inclusion of precision attachments and stress breakers. This can be directly linked to work undertaken for P5. Evidence may be in the same format as for P1.

M5 requires learners to compare the present CAD/CAM systems available for all-ceramic restorations. Learners need to compare different types of scanners, software and milling machines. They must compare in-house milling with using milling centres for different types of restorations and materials. This can be directly linked to work undertaken for P6. Evidence may be in the same format as for P1.

M6 requires learners to compare the materials and techniques that could be used to construct temporary restorations, giving advantages and disadvantages of each material and technique. This can be directly linked to work undertaken for P7. Evidence may be in the same format as for P1.

M7 requires learners to justify the importance of aesthetics in the production of diagnostic wax ups, giving advantages with assisting communication. This can be directly linked to work undertaken for P8. Evidence may be in the same format as for P1.

For D1, learners are required to evaluate the advantages and limitations of fixed prosthodontic treatment in order to reach a conclusion as to the necessity for fixed prosthodontic restorations. This can be directly linked to work undertaken for P1 and M1. Evidence may be in the same format as for P1.

D2 requires learners to discuss how the overall design of the restoration affects the aesthetics and function of the restoration. Learners must give examples of substructures, superstructures, materials, space requirement, preparation position and type. This can be directly linked to work undertaken for P3 and M2. Evidence may be in the same format as for P1.

D3 requires learners to evaluate the cost effectiveness of CAD/CAM systems currently available. Learners must show that they have researched the different systems and explain how they work, giving advantages and disadvantages of each system type, including open, semi open/semi closed and closed systems. This can be directly linked to work undertaken for P6 and M5. Evidence may be in the same format as for P1.

D4 requires learners to evaluate the importance of temporary restorations to the overall treatment plan of the patient. Learners must give evidence that they understand temporary restorations are used to aid treatment planning and patient care. This can be directly linked to work undertaken for P7 and M6. Evidence may be in the same format as for P1.

D5 requires learners to evaluate the importance of diagnostic wax ups to the overall treatment plan of the patient. Learners must give evidence that they understand diagnostic wax ups are used to aid treatment planning and patient care. This can be directly linked to work undertaken for P8 and M7. Evidence may be in the same format as for P1.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, M1, D1 | Treatment planning | You are involved in a discussion with the dental team and are asked to record a treatment plan. | • Written account<br>• Identification and recording information<br>• Charts |
| P2, P3, P4, M2, M3, D2 | Describe the design and manufacture of single-unit restorations | A dentist asks as part of their treatment planning for details of the single units available for a patient and their design requirements. | • Written account<br>• Identification<br>• Labelled diagrams |
| P5, M4 | Dental bridge design | Your laboratory requires a guide on the different types of dental bridges available and their specific design criteria. | • Written account<br>• Identification<br>• Labelled diagrams |
| P6, M5, D3 | All-ceramic systems | A dentist wishes to produce an all-ceramic restoration for a patient and would like a detailed reference as to what is available. | • Written account<br>• Diagrams<br>• Charts<br>• Data |
| P7, M6, D4 | Principles of temporary restorations | ABC Dental Laboratory would like a reference guide for their students to have an understanding of how to manufacture temporary crowns. | • Aesthetics<br>• Anatomical design<br>• Function<br>• Written account<br>• Diagrams<br>• Charts |
| P8, M7, D5 | The provision of diagnostic wax ups | A dentist has asked for a patient reference guide on the provision of diagnostic wax ups. | • Written account<br>• Diagrams<br>• Charts |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
| --- |
| Unit 2: Medical Emergencies, First Aid and Communication in the Dental Team |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 6: Dental Public Health and Preventative Dentistry |
| Unit 9: Dental Laboratory Compliance |
| Unit 11: Complex Dental Materials Science |
| Unit 12: Techniques for Manufacturing Fixed Prosthodontics |

## Essential resources

It is essential that a classroom is available for lectures, discussion and presentations. There must be library and ICT facilities available, and access to journals, websites and professional bodies to aid the development of learners. There should be specialist technical support available for learners. Staff delivering this unit should be registered, competent and experienced dental technicians with an in-depth knowledge of the subject. Ideally, they should have recent industrial experience within a fixed prosthodontic department or laboratory, or show evidence of regular contact with the industry.

## Employer engagement and vocational contexts

The manufacturing of fixed prosthodontics is an important part of dentistry. Custom-made dental appliances are essential for aesthetics, function and patient welfare. Where possible, learners should visit clinical and hospital departments or have visiting specialist lecturers from such establishments. Where this is not possible, learners should be provided with suitable resources, materials and simulation.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE1] Listing stages of treatment planning<br>[IE1] Describing types of single unit restorations<br>[IE1] Listing materials<br>[IE1] Explaining anatomical design features<br>[IE1] Describing bridge components<br>[IE1] Describing current CAD/CAM systems<br>[IE4] Explaining the use of temporary restorations<br>[IE6] Explaining the use of diagnostic wax ups |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Self-managers | [SM1] Discussing overall design<br>[SM1] Discussing CAD/CAM systems<br>[SM1] Discussing the importance of temporary restorations and diagnostic wax ups |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Searching the internet; entering data; word-processing documents to meet the requirements of assignments |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Reflecting on the way that an assignment has been tackled |
| Manage information storage to enable efficient retrieval | Saving information in suitable files in suitable folders |
| Follow and understand the need for safety and security practices | Keeping food and drink away from computers; not using someone else's login; explaining how safety is addressed in the context of the tasks; explaining why the IT usage policy forbids certain actions |
| Troubleshoot | Carrying out checks to identify the source of a problem encountered, e.g. missing file of work |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Using data from the internet, books, supplied by the tutor and the results of experiments to explain the stages of treatment planning |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Searching for data on the characteristics of materials recommended for use in fixed prosthodontics |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Collating data in tables and writing about trends in data; saving images of industrial production of substances and uses of substances; keeping records of properties studied |
| Bring together information to suit content and purpose | Collecting information in one file for editing into a suitable format |
| Present information in ways that are fit for purpose and audience | Presenting information in the formats required in the assignment briefs |

| Skill | When learners are… |
|---|---|
| Evaluate the selection and use of ICT tools and facilities used to present information | Evaluating whether the presentation of data is appropriate in terms of the grading criteria |
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Sending emails to tutors with appropriate information attached; demonstrating to tutors that email has been used appropriately; responding to feedback on assignments |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | Analysing data on flexural strengths and hardness |
| Identify the situation or problem and the mathematical methods needed to tackle it | Using appropriate methods to tackle presentation problems, e.g. use of graphs |
| Select and apply a range of skills to find solutions | Analysing data on material strengths and suitability |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | Estimating results; calculating using Excel or a calculator |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | Writing reports about material strengths using suitable mathematical language |
| Draw conclusions and provide mathematical justifications | Correctly identifying trends in data, using examples |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Taking part in class discussions about how trends may be described; interacting with external, industrial speakers; presenting data on materials |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading and comparing information from text and tables; using persuasive language in writing an article on aesthetics |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing reports, articles and notes as required by assignment briefs |

# Unit 11: Complex Dental Materials Science

**Unit reference number:** D/505/9592

**Level:** 3

**Credit value:** 10

**Guided learning hours:** 70

## Unit Aim

The aim of this unit is to give learners a good knowledge of scientific material principles, how to handle and dispose of dental materials safely and the cost implications and quality requirements when choosing materials.

This unit builds on the scientific knowledge learners gained in *Unit 4: Basic Dental Materials Science*. It is designed to give the learner an understanding of the dental materials used to construct complex dental devices and will assist them in the selection and manipulation of materials in the specialist units.

## Unit introduction

This unit covers how the properties of dental materials can be altered or enhanced for maximum benefit and the effects of the composition of dental materials on their function and properties.

Learning outcome 1 introduces learners to the metals and alloys used to construct a range of devices and components in all fields of dental technology.

Learning outcome 2 covers a variety of glass, ceramic and composite materials used to replicate natural teeth, and when to use them.

For learning outcome 3 learners will acquire knowledge of the characteristics and uses of refractory materials used in the lost wax process used to form metallic cast restorations and aesthetic ceramic castings. This outcome is directly linked to the practical work undertaken in *Unit 12: Techniques for Manufacturing Fixed Prosthodontics*.

Learning outcome 4 covers the properties and uses of common duplicating materials.

## Learning outcomes

**On completion of this unit a learner should:**

1. Understand the properties and uses of metals and alloys in dental technology
2. Understand the properties and manipulation of dental aesthetic type materials used in the construction of fixed prosthodontic devices
3. Know the properties and uses of dental refractory materials
4. Be able to use common duplicating materials to replicate dental models and appliances

## Unit content

### 1 Understand the properties and uses of metals and alloys in dental technology

*Basic metallurgy*: structure of metals and alloys, e.g. solid solutions, space lattice, grain boundaries; properties of pure metals; property changing by alloying metals; phase diagrams related to understanding alloy properties

*Alloys*: commonly used alloys; gold alloys; ceramic-bonding alloys, stainless steel alloys and cobalt chromium alloys

*Applied dental metallurgy*: ideal properties of alloys for dental devices; compositions and properties of gold alloys; carat ratings and the effect on properties; composition and properties of ceramic-bonding alloys, stainless steel alloys and cobalt chromium alloys; composition and properties of solders; biocompatibility, including allergies and hypersensitivity; corrosion and galvanic cells; joining metals by soldering and welding processes; safe handling and disposal; health and safety; quality assurance

*Changing structure*: work hardening, fatigue and failure, e.g. bending stainless steel wire, over-stressing wire, over-flexing of cast alloys; heat treatments, e.g. relieving work hardening by the application of heat; melting and casting, e.g. gas/air torch, induction, centrifugal casting, vacuum casting

*Processing techniques*: trimming, polishing and finishing methods; surface treatments, e.g. blasting, electrolytic polishing; layer structure and function, e.g. anodic, passive, Beilby; manipulation methods for wrought alloys

*Material selection*: properties in relation to the function of the dental device; cost analysis; availability and disposal; health and safety considerations; regulatory requirements

### 2 Understand the properties and manipulation of dental aesthetic type materials used in the construction of fixed prosthodontic devices

*Simulation of natural teeth*: material selection; constituents and properties of materials; effects of constituents on properties; optical features required of materials used to simulate natural teeth; pigments and colouring

*Material*: glass ceramic; oxide ceramic (e.g. zirconia); composite resins

*Chemistry*: chemical process during firing and curing; chemical bonding; fusion

*Application*: reasons for use; manipulation techniques; characterising materials; glazing processes and polishing systems; curing and firing cycles; health and safety considerations; cost analysis; quality assurance

### 3 Know the properties and uses of dental refractory materials

*Terms and characteristics*: refractory and binder; compensation expansion; heating cycles and breakdown

*Types and uses*: gypsum bonded, and phosphate bonded; constituents and properties of each type; effects of constituents on properties; refractory materials for fixed and removable prosthodontics, investments for ceramic work and soldering; surface mould finish and mould porosity; controlling expansion

*Application*: reasons for use; manipulation techniques; hardening refractory materials; setting and heating; removal from cast devices; safe storage, handling and disposal; environmental considerations; cost analysis; health and safety considerations; quality assurance

**4 Be able to use common duplicating materials to replicate dental models and appliances**

*Types and uses*: silicones; agars; constituents and properties of each type; model duplication; indices; moulds

*Application*: reasons for use; manipulation methods; pre-duplication surface treatments for models; safe storage, handling and disposal; health and safety considerations; cost analysis; quality assurance

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 compare the constituents, properties and uses of commonly used dental alloys [IE1, SM2] | M1 assess the ideal properties for alloys used in the construction of dental appliances | D1 evaluate the effect of changing the constituents ratio on the properties of dental alloys |
| P2 explain the methods used to heat and melt dental alloys | M2 discuss the various methods of changing the structure of dental alloys | D2 evaluate the methods for abrading and polishing the commonly used dental alloys |
| P3 compare the temperatures required to melt the commonly used dental alloys | | |
| P4 explain the purpose of each constituent present in dental ceramics and composites | M3 compare the properties of dental ceramics and composites to the commonly accepted ideal requirements of aesthetic dental materials | D3 evaluate the processing methods of dental ceramics and composites |
| P5 compare the types of metal-free ceramic core systems currently available | M4 discuss how each aesthetic system is used to produce natural looking restorations | D4 evaluate each aesthetic system against the ideal properties of aesthetic dental materials |
| P6 assess the manipulation techniques for ceramics and composites [CT2] | | |

| Assessment and grading criteria | | |
|---|---|---|
| P7 describe the constituents, properties and uses of the commonly used dental refractory materials [EP1] | | |
| P8 duplicate a range of models and appliances using various techniques and materials from given prescriptions | M5 discuss the properties of duplicating materials used | D5 evaluate the resultant product when using duplicating material systems |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

A variety of teaching methods and resources could be used to deliver this unit. External speakers, practical demonstrations and learner activities would enrich the unit delivery. Ideally, the unit should be presented in a laboratory environment. Assessment engages with a range of evidence sources, including written reports, practical tasks, tests and presentations.

## Delivery

This unit can be delivered mainly through formal lectures, seminars and research using the internet and/or library resources. The tutor may relate to these lectures etc., during practical demonstrations when using the relevant materials. Learners should be encouraged to use scientific calculators and research materials they use through dental supplies companies and the internet.

Whichever delivery methods are used, it is essential that tutors stress the importance of patient and learner welfare in relation to Control of Substances Hazardous to Health (COSHH) regulations, and the necessity for using the materials according to manufacturers' instructions to ensure quality standards and safety at all times.

Health and safety issues relating to working in a dental laboratory environment must be stressed and regularly reinforced and risk assessments must be carried out both in the training laboratory and work experience laboratory before starting practical activities.

Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units learners may be taking as part of the programme of study.

Learning outcome 1 is likely to be delivered through formal lectures, practical demonstrations and external speakers. It is important that learners understand the origin of alloys and the properties and uses of metals and alloys in dental technology. They will need an introduction to basic metallurgy and applied dental metallurgy.

Learners should become familiar with the various metal structures and gain insight into changing that structure. They will be directed in how to choose an appropriate material for the required purpose and learn to handle these materials in a suitable and safe manner. Learners will become aware of the health and safety requirements and quality assurance procedures necessary to ensure patient safety and satisfaction.

Visits from dental materials suppliers and manufacturers could enhance learners' understanding of the wide variety of dental materials available.

Learning outcome 2 covers the use of dental aesthetic materials for the construction of fixed prosthodontic devices. Materials to consider include dental ceramics and composites. Manipulation techniques should include compaction, firing, trimming and glazing/staining. Delivery should be through formal lectures, tutor demonstrations and independent learner research. However, it is usual for dental manufacturing and supplies companies to provide speakers, CD ROMs, videos, and so on, to advertise their products and these are all acceptable delivery methods.

Visits to laboratories that construct full ceramic restorations using CAD/CAM would give valuable insight into the methods used to produce these restorations. Visits from clinicians to speak about the materials used for fixed prosthodontic restorations would also be a valuable experience for learners. There are direct links with *Unit 15: Advanced Dental Technology Techniques and Procedures*.

Learning outcome 3 deals with the refractory materials used in the lost wax process, their characteristics and uses. Delivery will be mainly through formal lectures and independent learner research. It would be helpful for learners to research a wide range of materials from various manufacturers so that they become aware of the various handling techniques, manufacturing outcomes and cost implications. Sample packs of refractory materials are often available from dental material suppliers and a wide range of information is available in this area.

Local qualified technicians could be asked to give talks on their experiences of the different types of refractory materials and dental suppliers will arrange speakers and demonstrations from the manufacturers.

Learning outcomes 1 and 3 could be linked as most manufacturers and suppliers offer a casting system including alloys and refractory materials.

Learning outcome 4 covers a variety of dental duplicating materials used in dental technology and their application. Delivery techniques should be varied. It is expected that formal lectures, seminars, practical demonstrations and independent research by learners will form part of the delivery of this learning outcome.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Understand the properties and uses of metals and alloys in dental technology* | |
| Introduction to the learning outcome and dental alloys that will be investigated as part of this unit | 1 |
| Presentation on alloys: commonly used alloys; gold alloys; ceramic-bonding alloys, stainless steel alloys and cobalt chromium alloys | 2 |
| Learner-led research and discussion on the ideal properties of alloys for dental devices; compositions and properties of gold alloys; carat ratings and the effect on properties | 2 |
| Presentation and discussion on basic metallurgy: structure of metals and alloys, e.g. solid solutions, space lattice, grain boundaries; properties of pure metals; property changing by alloying metals; phase diagrams related to understanding alloy properties | 2 |
| Research into common compositions and properties of ceramic-bonding alloys, stainless steel alloys and cobalt chromium alloys | 2 |
| Discuss biocompatibility of alloys, including allergies and hypersensitivity; corrosion and galvanic cells; demonstration of electrochemistry | 2 |
| Demonstration of a metal casting technique, e.g. gas/air torch, induction, centrifugal casting, vacuum casting | 1 |
| Demonstration of soldering techniques | 2 |
| Presentation on the composition and properties of solders; joining metals by soldering and welding processes | 2 |
| Demonstrations covering trimming, polishing and finishing a range of metallic restorations | 2 |
| Discuss surface treatments, e.g. blasting, electrolytic polishing; layer structure and function, e.g. anodic, passive, Beilby; manipulation methods for wrought alloys | 2 |
| Discuss and demonstrate methods of changing alloy structures: work hardening, fatigue and failure, e.g. bending stainless steel wire, over-stressing wire, over-flexing of cast alloys; heat treatments, e.g. relieving work hardening by the application of heat | 2 |
| Present information on the properties of alloys in relation to the function of the dental device; cost analysis; availability and disposal; health and safety considerations, safe handling and disposal; quality assurance | 2 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Assignment 1: The properties and uses of metals and alloys in dental technology** (P1, P2, P3, M1, M2, D1, D2) | 7 |
| **Learning outcome 2** | |
| *Understand the properties and manipulation of dental aesthetic type materials used in the construction of fixed prosthodontic devices* | |
| Discussion on the ideal properties of aesthetic materials used in dental technology to replicate natural tissues. Application of materials: reasons for use; manipulation and application techniques | 2 |
| Learner activity: investigate a range of materials that can be used to fabricate natural dentition | 1 |
| Presentation and demonstration on the techniques used to promote the simulation of natural teeth | 2 |
| Discussion relating to factors that lead to aesthetic material selection | 1 |
| Learner activity: manipulate materials to demonstrate a basic aesthetic build-up technique | 2 |
| Presentation on the constituents and properties of materials | 1 |
| Learner activity: differences in technique when using ceramic and composites | 1 |
| Presentation on the optical features required of materials used to simulate natural teeth; pigments and colouring | 1 |
| Discussion and demonstration of techniques used to select shade | 1 |
| Learner practical: draw a tooth highlighting the internal natural characteristics | 1 |
| Discuss how artificial materials replicate natural dentition | 1 |
| Presentation on the chemistry relating to ceramics and composites: chemical process during firing and curing; chemical bonding; fusion | 2 |
| Demonstration of ceramic firing and composite curing | 1 |
| PowerPoint delivery reinforcing the demonstration | 2 |
| Demonstration of ceramic application techniques and learner practical | 2 |
| Characterising materials; glazing processes and polishing systems; curing and firing cycles | 1 |
| Continuation of practical demonstration | 1 |
| Group discussion on the health and safety considerations; cost analysis; quality assurance | 1 |
| **Assignment 2: The properties and manipulation of ceramic and composite materials** (P4, P5, P6, M3, M4, D3, D4) | 7 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 3** | |
| *Know the properties and uses of dental refractory materials* | |
| Presentation introducing this type of dental material | 1 |
| Terms and characteristics: refractory and binder; compensation expansion; heating cycles and breakdown | 1 |
| PowerPoint delivery | 2 |
| Presentation and discussion on the sources of refractory materials | 2 |
| Presentation of the science behind refractory materials including their constituents and properties; effects of constituents on properties | 1 |
| Discussion on the application: reasons for use; manipulation techniques; hardening refractory materials; setting and heating | 2 |
| Learner activity: investigate the uses of refractory materials employed as part of the manufacture processes for fixed and removable prosthodontics, ceramic work and soldering | 1 |
| Presentation and hand-out | 1 |
| Demonstration of mixing techniques | 1 |
| Presentation on the effects of refractory material failure, including surface mould finish and mould porosity; controlling expansion | 1 |
| Learner discussion on how to limit failures | 1 |
| Presentation on and demonstration of the techniques used in the removal from cast devices; safe storage, handling and disposal; environmental considerations; cost analysis; health and safety considerations; quality assurance | 1 |
| Practical demonstration | 1 |
| Learner activity: risk-assess process | 1 |
| **Assignment 3: The characteristics and uses of refractory materials used in the lost wax technique** (P7) | 6 |
| **Learning outcome 4** | |
| *Be able to use common duplicating materials to replicate dental models and appliances*<br>Discussion considering the different types of duplicating materials<br>Presentation used to deliver underpinning knowledge of material properties of duplicating materials | 2<br>2 |
| Practical demonstration of techniques used to duplicate items in a dental context<br>A presentation taking into account the uses of a range of duplicating materials silicones: agars; constituents and properties of each type; model duplication; indices; moulds | 3<br>2 |
| Learner practical using materials | 3 |
| **Assignment 4: The properties and uses of duplicating materials** (P8, M5, D5) | 6 |
| **Total learning time hours** | **103** |

## Assessment

To achieve a **pass** grade, learners must achieve **all eight** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all five** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all five** distinction criteria as outlined in the grading grid.

For P1, learners are expected to compare the constituents, properties and uses of commonly used dental alloys. Evidence for this could take the form of a pictorial presentation with notes (possibly using appropriate software), an annotated poster or leaflet. Alternatively, it could be linked as a project with P2 and P3.

For P2, learners are expected to explain the methods available to heat and melt dental alloys. Evidence for this could take the form of a pictorial presentation with notes (possibly using appropriate software), an annotated poster or leaflet. Alternatively, it could be linked as a project with P1 and P3.

For P3, learners must compare melting ranges for commonly used dental alloys. This can be evidenced as part of a project with P1 and P2.

For P4, learners must explain the purpose of each constituent present in dental aesthetic materials (ceramic and composite). This can be evidenced as part of a report with P5 and P6.

For P5, learners are required to compare the types of metal-free ceramic core systems that are currently available. Evidence for this could be presented as part of a report with P4 and P6 or as an annotated poster or leaflet.

For P6, learners are expected to assess the manipulation techniques for ceramics and composites. Evidence for this criterion could be supported by practical assessment and a presentation demonstrating the learner's practical techniques. Evidence could be presented in the same format as for P4 and P5.

For P7, learners must describe the constituents, properties and uses of commonly used dental refractory materials. Evidence for this could be provided in a written report format.

For P8, learners must duplicate a range of models and appliances, for different purposes, using a variety of materials and techniques from given prescriptions. These models and appliances might be duplicated both in the learning institution and the workplace and must be to a clinically accepted standard. The actual duplicated items would be the evidence in the learning institution and a witness statement might be used as evidence from the workplace. If assessed during a placement, the witness statement should be provided by the workplace supervisor and verified by the tutor. Guidance on the use of witness statements is given on our website. Learners are permitted substantial guidance from tutors and workplace supervisors.

For M1, learners are required to assess the ideal properties of dental alloys used in the construction of dental appliances. Evidence should be broad ranging and include a variety of dental devices. This can be directly linked to work undertaken for P1. Evidence may be in the same format as for P1.

For M2, learners are expected to discuss the various methods of changing the structure of dental alloys. This can be directly linked to work undertaken for P2. Evidence may be in the same format as for P2.

For M3, learners need to compare the properties of dental ceramics and composites to the commonly accepted ideal requirements of aesthetic dental materials. This can be linked directly with work undertaken for P4. Evidence may be in the same format as for P4.

For M4, learners must discuss how aesthetic systems are used to produce natural looking restorations. This can be linked directly with work undertaken for P5. Evidence may be in the same format as for P5.

M5 requires learners to investigate and discuss the properties of a range of duplicating materials. Evidence may be in the form of a practical and written report.

For D1, learners are expected to evaluate the effect of changing the constituents ratio on the properties of dental alloys. This can be directly linked to work undertaken for P1. Evidence may be in the same format as for P1.

For D2, learners are required to evaluate the methods for abrading and polishing the commonly used dental alloys. They must include a broad range of techniques and materials with information from various manufacturers and suppliers. This can be directly linked to work undertaken for P2 and M2. Evidence may be in the same format as for P2.

For D3, learners need to evaluate the processing methods of dental ceramics and composites. The evidence produced must be broad ranging and feasible. This can be directly linked to work undertaken for P4 and M3. Evidence may be in the same format as for P4.

For D4, learners must evaluate aesthetic systems against the ideal properties of aesthetic dental materials, considering cost, strength, ease of use, staff training and prognosis of appliances. This can be directly linked to work undertaken for P5, P6 and M4. Evidence may be in the same format as for P5 and P6.

For D5, learners are expected to evaluate items produced using duplicating techniques and materials. The evidence produced must be broad ranging and feasible. This can be directly linked to work undertaken for M5. Evidence may be in the same format as for M5.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, P2, P3, M1, M2, D1, D2 | The properties and uses of metals and alloys in dental technology | You have been appointed to a metal production department in a dental laboratory. You are informed by your mentor of the importance of alloy selection and use in the construction of dental appliances. The mentor requires you to design and deliver a presentation on the properties, manipulation techniques and uses of common types of alloys in order to demonstrate your knowledge of the subject before you start to construct metal restorations. | • Presentations using ICT techniques |
| P4, P5, P6, M3, M4, D3 D4 | The properties and manipulation of ceramic and composite materials | Cosmetic dentistry has seen an increase in patient demand for natural looking restorations. The current material trend requires you to be skilled in the use of aesthetic materials.<br>The laboratory that you work for has no knowledge of aesthetic materials. Your employer requires you to investigate a range of current materials that can be used to return good aesthetic properties. You will need to present your findings to the employer in the form of a written report, making recommendations so that your employer can buy a new system. | • Written report |
| P7 | The characteristics and uses of refractory materials used in the lost wax technique | You are now competent at waxing up restorations and want to carry out the next stage in the construction process of fixed prosthodontic restorations. To demonstrate your knowledge of refractory materials, your mentor has asked you to write a report on the uses of refractory materials. | • Written report |

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P8, M5, D5 | The properties and uses of duplicating materials | As your practical abilities improve, you are asked to carry out more complex manufacturing techniques. As part of this process, you are required to improve your knowledge of duplicating materials used for a range of techniques and appliances. | • Practical and written report |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 8: Removable Partial Prosthodontics |
| Unit 12: Techniques for Manufacturing Fixed Prosthodontics |
| Unit 14: Design, Manufacture and Modification of Orthodontic Appliances |
| Unit 15: Advanced Dental Technology Techniques and Procedures |
| Unit 16: Work-based Learning in Dental Technology |

## Essential resources

A fully-equipped dental laboratory is required for this unit. The laboratory should be fitted with appropriate benching, hand pieces, extractor units, mixing machines, model trimmers, gel machines, Bunsen burners, first aid kits, fire extinguishers, PPE, infection control and safety equipment, and a wide range of dental materials. Learners should be equipped with full dental toolkits and a selection of trimming burs for a variety of materials.

Access to hospital and commercial dental laboratories that provide a range of dental technology services is very important.

Staff delivering this unit should be competent, experienced, and registered dental technicians. Ideally, they should have recent laboratory experience within dental technology and show evidence of regular contact with the industry and/or technical updating.

Learners will need access to library and ICT facilities with a range of relevant books, journals and software applications.

## Employer engagement and vocational contexts

Learners will benefit from additional support from external companies, field trips and work experience in a dental laboratory.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Creative thinkers | [CT2] Asking questions to extend their knowledge during tutor practical demonstrations showing the ceramic and composite processing techniques |
| Reflective learners | [RL4] Reacting to the feedback they receive following the completion of their practical task of duplicating models and appliances |
| Team workers | [TM7] Acting in a responsible manner during a field trip to alloy supply companies<br>Showing confidence in their approach to the field trip by asking questions on a complex subject |
| Self-managers | [SM2] Working towards the grading criteria to select constituents, properties and uses of dental alloys |
| Effective participators | [EP1] Carrying out their risk assessment into the use of refractory materials |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE2] Developing their ceramic and composite presentations<br>[IE7] Explaining their evidence during their presentation and providing reasoned conclusions to their evidence |
| Creative thinkers | [CT4] Questioning other learners about their conclusions to their dental alloy presentations |
| Reflective learners | [RL6] Delivering their dental alloy presentations to their peers |
| Team workers | [TM4] Listening to peer presentations in a fair and considerate manner |
| Self-managers | [SM3] Managing their assignments; setting goals and achievable targets |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Using computers to develop and deliver their presentations |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Recording information to present in a case study |
| Manage information storage to enable efficient retrieval | Saving material and assignment files in organised folders |
| Follow and understand the need for safety and security practices | Following associated health and safety procedures related to the use of computers and VDUs |
| Troubleshoot | |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Using multimedia software to formulate assignments |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Searching websites for information and demonstrating the ability to extract details that are relevant to the purpose of the task |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Able to store and recall information electronically that satisfies the requirements of the grading criteria in this unit, e.g. ICT presentation on dental alloys |
| Bring together information to suit content and purpose | Generating reports or essays which include essential data to inform the reader of the uses of a specific dental material, e.g. refractory dental materials |
| Present information in ways that are fit for purpose and audience | Submitting evidence in a variety of formats to meet the requirements of the brief |

| Skill | When learners are… |
|---|---|
| Evaluate the selection and use of ICT tools and facilities used to present information | Assessing their use of IT to produce documents and reflecting on their skill development needs in this area |
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Communicating using email and chat rooms (Moodle) with peers and tutors, e.g. support for assignment development |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | Using mixing ratios and quantity whilst using materials in an effective manner |
| Identify the situation or problem and the mathematical methods needed to tackle it | Investing multiple rings with refractory investment materials |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | Finalising their projects and preparing them for submission or presentation |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Taking part in group discussions, assignment seminars and tutorials |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Researching material using books, journals and the internet |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing technical reports, case studies and essays following the requirements of the assignment brief |

# Unit 12: Techniques for Manufacturing Fixed Prosthodontics

**Unit reference number:** H/505/9593

**Level:** 3

**Credit value:** 15

**Guided learning hours:** 120

## Unit Aim

The aim of this unit is to enable learners to understand the principles and techniques involved in the design and manufacture of fixed prosthodontics. It also links the importance of aesthetics, patient welfare and function in the manufacturing of custom-made appliances.

## Unit introduction

This unit introduces learners to the manufacturing techniques used in fixed prosthodontic restorations. It will give them an insight into current methods of construction and the materials used. Learners will also have the opportunity to design and construct a range of fixed prosthodontic restorations and gain basic skills using a wide range of dental biomaterials.

Learning outcomes 1, 2 and 5 provide learners with the knowledge and skills to produce metallic and non-metallic substructures.

For learning outcomes 3 and 4, learners will gain an understanding of the techniques required to build up ceramic and composite materials and they will become skilled in the manipulation of these materials. Learners will appreciate the necessity of providing excellent aesthetic results to the patient.

Finally, learners will discover methods of manufacturing temporary restorations and diagnostic wax ups and will construct them using a variety of materials.

Learners will be made aware of necessary prescription requirements, health and safety precautions and quality measures required to produce these dental appliances.

## Learning outcomes

### On completion of this unit a learner should:

1. Understand the manufacturing processes used to produce substructures
2. Be able to manufacture substructures
3. Understand the principles of applying the aesthetic superstructure
4. Be able to build up the aesthetic superstructure
5. Be able to manufacture substructures for multi-unit restorations
6. Be able to produce temporary restorations and diagnostic wax ups

## Unit content

**1 Understand the manufacturing processes used to produce substructures**

*Manufacturing process*: prescription review; protecting patient information; stages of manufacturing; methods for producing metal copings; methods for producing ceramic copings; methods for producing post and cores; spruing principles and techniques; application of investment materials; furnace burnout requirements; casting and melting methods; fitting and finishing processes, including review of fitness for purpose; reasons for casting failures; soldering techniques; health and safety; relevant professional codes of practice; effective communication and feedback to and from members of the dental team

**2 Be able to manufacture substructures**

*Construction methods:* construction of commonly used metallic and other material substructures, e.g. casting and milling wax pattern construction; spruing and investing; furnace burnout; melting metal and casting; fitting and finishing restorations; preventing casting failures; health and safety; relevant professional codes of practice

**3 Understand the principles of applying the aesthetic superstructure**

*Ceramic aesthetics:* reasons for opaque application; methods of producing ceramic cores; ceramic build-up techniques; methods and techniques for ceramic application; firing temperatures; staining and glazing techniques; characterising methods

*Composite/polymeric aesthetics:* opaque application; build-up techniques; reasons for various curing cycles; finishing and characterising methods; health and safety; relevant professional codes of practice

**4 Be able to build up the aesthetic superstructure**

*Ceramic aesthetics:* metal preparation; opaque application; ceramic build-ups; applying ceramics; condensing ceramics; sintering and crystallisation of ceramics; characterising ceramics; shade matching

*Composite/polymeric aesthetics*: building up composites/polymers; curing cycles for composites/polymers; finishing and characterising composites/polymers; shade matching; health and safety; relevant professional codes of practice

**5 Be able to manufacture substructures for multi-unit restorations**

*Construction methods:* construction of commonly used substructures, wax pattern construction; spruing and investing; furnace burnout; melting metal and casting; alloy milling; pressing and milling ceramics; milling zirconia; fitting and finishing of bridge restorations

**6 Be able to produce temporary restorations and diagnostic wax ups**

*Temporary restorations:* construction techniques commonly used; material selection; shade matching

*Diagnostic wax ups*: building up and shaping teeth; aesthetic implications; techniques to space fill

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 explain the methods used in the construction of substructures [IE2] | M1 discuss current casting and melting methods, including common casting faults and their reasons | D1 evaluate the techniques for soldering, pre and post ceramic |
| P2 construct single-unit substructures for anterior and posterior restorations from given prescriptions [SM3] | | |
| P3 explain the reasons for opaquing metal substructures [IE1] | M2 compare methods of condensing ceramic and of staining and characterising ceramic and composite superstructures | D2 discuss firing and curing cycles, including the requirements for glazing and finishing methods to be used |
| P4 explain the build-up techniques for ceramic and composite superstructures [IE4] | | |
| P5 apply ceramic and composite materials to metal substructures for anterior and posterior restorations from given prescriptions [SM2] | | |

| Assessment and grading criteria | | | |
|---|---|---|---|
| P6 | construct substructures for anterior and posterior dental bridges from given prescriptions [SM3] | | |
| P7 | construct temporary restorations from given prescriptions [SM3] | | |
| P8 | construct diagnostic wax ups from given prescriptions [SM3] | | |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

The delivery of this unit should be stimulate the learner using a wide range of methods, including formal lectures, discussions, Q&A sessions, practical activities and the use of ICT facilities. Site visits from subject specialists are recommended. Assessment may take the form of practical simulation, viva voce, summative examination and independent research for written assignments.

## Delivery

This unit gives learners practical and theoretical knowledge of the manufacturing of fixed prosthodontic restorations. Lectures, practical demonstrations, discussions, seminar presentations, supervised practical activities, research using the internet and/or library resources and personal and laboratory experience are all suitable methods of delivery.

Learners should complete work placements, which should be monitored regularly to ensure the quality of the learning experience. During placements it would be beneficial if learners and supervisors were made aware of the requirements of this unit prior to any work-related activities, so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to produce a range of simple fixed prosthodontic dental appliances, such as waxing up metal substructures or gold shell crowns, and they should be encouraged to collect record sheets of work undertaken with supervisor comments regarding quality and standard.

Whichever delivery methods are used, it is essential that tutors stress the importance of patient welfare so learners understand why an appliance is made in such a way, the dental technology techniques used for making the fixed prosthodontics and the importance of accuracy and quality.

Learners must be informed about health and safety issues relating to working in a dental laboratory when using hazardous materials and equipment. This should be regularly reiterated. Risk assessments must also be undertaken prior to practical activities.

Tutors should consider integrating the delivery, private study and assessment relating to this unit with other relevant units that cover, for example, tooth anatomy and morphology, which are extremely important when building up crowns. This will make them aware of the different materials that could be used, and the advantages and disadvantages of each.

Learning outcomes 1, 2 and 5 are linked. Learners will become aware of the manufacturing methods for substructures and learn how to produce a range of these substructures. These learning outcomes are likely to be delivered through formal lectures, demonstrations, discussions, work placements and independent learner research.

Visiting expert speakers, such as dental supplies representatives or qualified dental technicians, could add to the relevance of the subject for learners. For example, in lectures and seminars they could talk about their work, materials and methods of manufacture, and give demonstrations.

Learning outcomes 3 and 4 are linked and cover the principles and practice of applying aesthetic bonded superstructures to the substructure. Learners will have the opportunity to build up the superstructures. Delivery techniques should be varied and can be linked to the delivery of learning outcomes 1 and 2. It is expected that formal lectures, discussions, demonstrations, supervised practical activities and work placements would form part of the delivery of these outcomes.

Visiting expert speakers could add to the relevance of the subject for learners. For example, an expert ceramist could demonstrate and discuss the importance of the aesthetic superstructure. Learners will also gain experience and knowledge of different ceramic and composite materials from work placements.

Learning outcome 5 looks at the methods commonly used to produce temporary restorations and diagnostic wax ups. It is expected that formal lectures, demonstrations, supervised practical activities and work placements will form part of the delivery of this outcome.

Health and safety issues and patient welfare must be addressed before learners undertake any practical work. Adequate PPE must be provided and used following the production of suitable risk assessments.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Understand the manufacturing processes used to produce substructures* | |
| Introduce safety in laboratory – hazards – appropriate to unit | 2 |
| Explain the methods of constructing substructures | 2 |
| Introduce stages of manufacturing | 2 |
| Discuss methods for producing copings | 2 |
| Discuss methods for producing post and cores | 3 |
| Discuss spruing principles and techniques | 2 |
| Identify furnace burnout requirements, casting and melting methods, fitting and finishing processes | 2 |
| Describe current casting and melting methods, including common casting faults and their reasons | 2 |
| Evaluate the techniques for soldering, pre and post ceramic | 3 |
| Discuss Medical Devices Regulation (MDR), relevant current legislation and codes of practice | 2 |
| **Assignment 1: Substructure manufacture, casting techniques and soldering techniques** (P1, M1, D1) | 4 |
| **Learning outcome 2** | |
| *Be able to manufacture substructures* | |
| Health and safety; Medical Devices Regulation (MDR); relevant current legislation and codes of practice | 2 |
| Demonstrate construction methods | 2 |
| Demonstrate techniques for manufacturing copings | 2 |
| Learners carry out manufacturing copings | 4 |
| Demonstrate post and core manufacture | 2 |
| Learners carry out post and core manufacture | 4 |
| Learners practise wax pattern construction | 4 |
| Learners practise spruing and investing techniques | 2 |
| Demonstrate melting metal and casting, fitting and finishing restorations<br>Demonstrate techniques for preventing casting failures | 2 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Construct single-unit substructures for anterior and posterior restorations from given prescriptions<br>Practical assessment of work produced, discussion and feedback (P2) | 1 |
| **Learning outcome 3** | |
| *Understand the principles of applying the aesthetic superstructure Ceramic bonding* | |
| Discuss aesthetics | 2 |
| Discuss reasons for opaque application | 2 |
| Discuss ceramic application and build-up techniques | 3 |
| Discuss condensing techniques | 2 |
| Discuss firing temperatures | 3 |
| Discuss staining and glazing techniques | 2 |
| Discuss characterising methods | 2 |
| Composite/polymeric | |
| Discuss opaque application | 2 |
| Discuss building up composites/polymers | 3 |
| Discuss curing cycles for composites/polymers | 2 |
| Discuss finishing and characterising composites/polymers | 2 |
| **Assignment 2: Superstructure manufacturing techniques, condensing and firing cycles** (P3, P4, M2, D2) | 4 |
| **Learning outcome 4** | |
| *Be able to build up the aesthetic superstructure*<br>*Ceramic bonded to metal/full ceramic* | |
| Demonstrate metal preparation of copings for opaque application | 2 |
| Learners carry out metal preparation of copings for opaque application | 3 |
| Demonstrate opaque application | 2 |
| Learners carry out opaque application | 2 |
| Demonstrate ceramic build-ups applying ceramics – condensing ceramics | 2 |
| Learners carry out ceramic build-ups applying ceramics – condensing ceramics | 4 |
| Demonstrate firing ceramics | 2 |
| Demonstrate characterising ceramics | 2 |
| Demonstrate shade matching | 2 |
| Composite/polymeric: | |
| Demonstrate opaque application | 2 |
| Learners carry out opaque application | 2 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Demonstrate building-up techniques | 2 |
| Learners carry out building-up techniques | 1 |
| Demonstrate curing cycles for composites/polymers | 1 |
| Demonstrate finishing and characterising composites/polymers | 1 |
| Demonstrate shade matching | |
| **Practical assessment of work produced, discussion and feedback** (P5) | 1 |
| **Learning outcome 5** | |
| *Be able to manufacture substructures for multi-unit restorations* | |
| Demonstrate wax pattern construction for bridges | 2 |
| Learners carry out wax pattern construction for bridges | 3 |
| Demonstrate spruing and investing techniques | 1 |
| Learners carry out spruing and investing techniques | 3 |
| Demonstrate melting metal and casting | 2 |
| Learners carry out fitting and finishing restorations | 3 |
| **Practical assessment of work produced, discussion and feedback** (P6) | 1 |
| **Learning outcome 6** | |
| *Be able to produce temporary restorations and diagnostic wax ups* | |
| *Temporary restorations* | |
| Demonstrate construction techniques commonly used | 2 |
| Learners carry out construction of temporary restoration | 3 |
| Demonstrate shade matching and characterisation | 2 |
| Learners carry out shade matching and characterisation | 2 |
| Diagnostic wax ups | |
| Demonstrate diagnostic wax up techniques | 2 |
| Learners carry out diagnostic wax up | 3 |
| Demonstrate building up and shaping teeth | 3 |
| Learners carry out building up and shaping teeth | 2 |
| Demonstrate aesthetic implications | 2 |
| Demonstrate techniques to space fill | 2 |
| **Practical assessment of work produced, discussion and feedback** (P7, P8) | 1 |
| **Total learning time hours** | **150** |

## Assessment

All learners are entitled to initial guidance in planning their work, but the level of assistance required should be taken into account when their work is assessed.

All work produced needs to be manufactured to a clinically acceptable standard, adhering to all health and safety and quality assurance requirements.

To achieve a **pass** grade, learners must achieve **all eight** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **both** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **both** distinction criteria as outlined in the grading grid.

For P1, learners will be expected to explain the methods commonly used to construct substructures, including all methods listed in the unit content. Evidence for this could take the form of a pictorial presentation with an explanation, a report with diagrams, an annotated poster or leaflet. It could also be linked to assessment for P2.

P2 requires learners to construct substructures for anterior and posterior restorations, for the application of ceramic and composite materials from a given prescription. Tutors should identify the objectives, which are likely to be driven by the requirements of the Medical Devices Regulation (MDR). Learners must be given the same type and complexity of appliance to ensure fairness of assessment. Learners could submit a practical piece of work to be formally assessed or the criterion could be assessed directly by the tutor during practical activities. If the direct format is used, suitable evidence would be observation records completed by learners and the tutor.

For P3, learners must explain the reasons for opaquing substructures and build-up techniques for ceramic and composite materials. Learners will be expected to cover the range of methods listed in the unit content. Evidence may be in the same format as for P1.

P4 requires learners to explain commonly used build-up techniques for ceramic and composite superstructures. Evidence for this could take the form of a pictorial presentation with an explanation, a report with diagrams, an annotated poster or leaflet.

P5 requires learners to apply ceramic and composite material to substructures, from a given prescription. Tutors should identify the objectives, which are likely to be driven by the requirements of the Medical Devices Regulation (MDR). Learners must be given the same type and complexity of appliance to ensure fairness of assessment. Learners are not expected to use all of the methods listed in the unit content for learning outcome 4. Evidence may be in the same format as for P2.

P6 requires learners to construct substructures for anterior and posterior dental bridges, from a given prescription. Tutors should identify the objectives, which are likely to be driven by the requirements of the Medical Devices Regulation (MDR). Where possible, the type and complexity of these should be the same for all learners to ensure fairness of assessment. Learners are not expected to use all of the methods listed in the unit content for learning outcome 5. Evidence may be in the same format as for P2.

P7 requires learners to design and construct temporary restorations, from a given prescription. Tutors should identify the objectives, which are likely to be driven by the requirements of the Medical Devices Regulation (MDR). Where possible, the type and complexity of these should be the same for all learners to ensure fairness of assessment. Learners are not expected to use all of the methods listed in the unit content for learning outcome 6. Evidence may be in the same format as for P2.

P8 requires learners to design and construct a diagnostic wax up, from a given prescription. Tutors should identify the objectives, which are likely to be driven by the requirements of the Medical Devices Regulation (MDR). Where possible, the type and complexity of these should be the same for all learners to ensure fairness of assessment. Learners are not expected to use all of the methods listed in the unit content for learning outcome 6. Evidence may be in the same format as for P2.

For M1, learners must discuss current casting and melting methods, including common casting faults and their reasons. Evidence may be in the same format as for P1.

M2 requires learners to compare methods of condensing ceramic materials and include the methods used to stain and characterise restorations. This can be directly linked to work undertaken for P3. Evidence may be in the same format as for P1.

For D1, learners are required to evaluate the techniques used for pre and post ceramic soldering. This can be associated with M1. Evidence may be in the same format as for P1 or short answer questions.

D2 requires learners to discuss firing and curing cycles and explain why glazing and finishing methods are required. This can be directly linked to P3 and M2. Evidence may be in the same format as for P1.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, M1, D1 | Substructure manufacture, casting techniques and soldering techniques | Your laboratory has asked for a detailed guide on manufacturing and casting procedures for their trainees to produce substructures. | • Written account<br>• Identification and recording<br>• Diagrams |
| P3, P4, M2, D2 | Superstructure manufacturing techniques, condensing and firing cycles | Your laboratory has requested a detailed guide on superstructure manufacturing techniques. | • Written account<br>• Identification and recording<br>• Diagrams |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 6: Dental Public Health and Preventative Dentistry |
| Unit 10: Design of Fixed Prosthodontics |
| Unit 11: Complex Dental Materials Science |
| Unit 16: Work-based Learning in Dental Technology. |

## Essential resources

A training dental laboratory equipped with appropriate benching, lighting, hand pieces, materials and machinery to manufacture the various appliances in this unit. The important materials for this unit are a ceramic system, composite, tooth coloured acrylic, die stone, dental waxes, alloys, solder and investment materials. Machinery such as casting machines, furnaces, and light curing facilities are required. It is essential that a classroom is available for lectures, discussions and presentations. Learners also need access to a library, ICT and professional bodies. Staff delivering this unit should be registered, competent and experienced dental technicians with an in-depth knowledge of the subject. Ideally, they should have recent industrial experience within a fixed prosthodontic department or laboratory, or show evidence of regular contact with the industry.

## Employer engagement and vocational contexts

The manufacturing of fixed prosthodontics is an important part of dentistry. Custom-made dental appliances are essential for aesthetics, function and patient welfare. Where possible, learners should visit clinical and hospital departments or have visiting specialist lecturers from such establishments. Where this is not possible, learners should be provided with suitable resources, materials and simulation.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE1] Explaining reasons for opaquing<br>[IE2] Describing methods of constructing substructures<br>[IE4] Describing build-up techniques for ceramic and composite superstructures |
| Self-managers | [SM2] Applying ceramic and composite materials to substructures for anterior and posterior restorations<br>[SM3] Constructing substructures for anterior and posterior dental bridges from given prescriptions |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Creative thinkers | [CT1] Discussing firing and curing cycles, including why glazing and finishing methods are required |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Searching the internet; entering data; word-processing documents to meet the requirements of assignments |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Reflecting on the way that an assignment has been tackled |
| Manage information storage to enable efficient retrieval | Saving information in suitable files in suitable folders |
| Follow and understand the need for safety and security practices | Keeping food and drink away from computers; not using someone else's login; explaining how safety is addressed in the context of the tasks; explaining why the IT usage policy forbids certain actions |
| Troubleshoot | Carrying out checks to identify the source of a problem encountered, e.g. missing file of work |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Using data from the internet, books, supplied by the tutor and the results of experiments to explain the methods used in the manufacture of fixed prosthodontics |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Searching for data on the build-up techniques for ceramic and composite superstructures and evaluating whether it meets the requirements of the assignment task |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Collating data in tables and writing about trends in data relating to furnace burnout requirements; casting and melting methods. Keeping records of properties studied |
| Bring together information to suit content and purpose | Collecting information in one file for editing into a suitable format |

| Skill | When learners are… |
|---|---|
| Present information in ways that are fit for purpose and audience | Presenting information in the formats required in the assignment briefs |
| Evaluate the selection and use of ICT tools and facilities used to present information | Evaluating whether the presentation of data is appropriate in terms of the grading criteria |
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Sending emails to tutors with appropriate information attached; demonstrating to tutors that email has been used appropriately; responding to feedback on assignments |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | Analysing possible casting faults, e.g. temperature |
| Identify the situation or problem and the mathematical methods needed to tackle it | Analysing data on flexural strengths and hardness |
| Select and apply a range of skills to find solutions | Using appropriate methods to tackle presentation problems, e.g. use of graphs |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | Analysing data firing parameters |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | Estimating results; calculating using Excel or a calculator |
| Draw conclusions and provide mathematical justifications | Writing reports about material strengths using suitable mathematical language |

| **English** | |
|---|---|
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Taking part in class discussions about how trends may be described; interacting with external, industrial speakers; presenting data on materials |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading and comparing information from text and tables; using persuasive language in writing an article on aesthetics |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing reports, articles and notes as required by assignment briefs |

# Unit 13: Orthodontic Therapy Principles

**Unit reference number:** K/505/9594

**Level:**

**Credit value:** 5

**Guided learning hours:** 30

## Unit Aim

The aim of this unit is for learners to gain knowledge and understanding of the rationale and principles of orthodontics, normal and abnormal tooth eruption, occlusion and malocclusion. Learners will become familiar with the techniques and therapy regimes that are used to modify tooth eruption and occlusion.

## Unit introduction

The dental technician's primary role in the workplace is to manufacture dental devices. It is very important that the technician understands the need for orthodontics in society, the changes in oral tissues that the devices produce and how these changes occur.

It is important that learners undertaking this area of study should gain understanding of the principles and theories of orthodontic therapy, and an awareness and appreciation of the full range of orthodontic treatment regimes: simple removable orthodontic therapy, fixed orthodontic therapy and functional appliance therapy.

This unit deals with knowledge and understanding of normal and abnormal tooth eruption, both in deciduous and permanent teeth, and how this may affect occlusion or be one of the determining factors of malocclusion.

As the correction of malocclusion is the main purpose of orthodontic treatment, the unit covers the classification of malocclusion to ensure that there is effective communication between clinician and technician when discussing the details of patients' malocclusion.

To correct malocclusions, tooth movement is often needed. These tooth movements occur through the application of forces. These forces and their application need to be understood to be able to design and manufacture appliances that will create the oral changes detailed in the treatment plans.

Learners need to develop an understanding of anchorage, retention and extra-oral traction to control tooth movement and to aid in the design of effective appliances.

This unit provides the background theory that is necessary to produce orthodontic appliances to clinically presentable standards.

## Learning outcomes

**On completion of this unit a learner should:**

1. Understand the rationale for orthodontic therapy
2. Know the theory and features of occlusion
3. Understand the theory of physiological tooth movement and retention in the human dentition
4. Understand the principles of active orthodontic therapy regimes

## Unit content

### 1 Understand the rationale for orthodontic therapy

*Aims and objectives:* the scope and limitations of orthodontic therapy; recognition of abnormalities and need for treatment; principles of treatment planning, importance of diagnostic aids, e.g. radiographs

*Indications and contra-indications:* factors related to the success of orthodontic treatment; common causes of treatment failure; dental health

*Benefits, disadvantages and potential risks:* benefits (function, aesthetics, speech, psychological wellbeing, dental health); disadvantages and potential risks (root resorption, loss of periodontal support, decalcification, soft tissue damage); complexity of individual treatment; time and resources required

### 2 Know the theory and features of occlusion

*Occlusion:* principles of ideal occlusion; ideal occlusion compared to malocclusion; mal-position of individual teeth; limitations of removable orthodontic therapy to achieve ideal occlusion

*Malocclusion:* aetiology and classification; Angle's classification; incisor classification; skeletal classification; mal-relationship of the dental arches; disorders related to the development of malocclusion

### 3 Understand the theory of physiological tooth movement and retention in the human dentition

*Tooth movement:* physiological changes; influence; application of forces

*Recording tooth movement:* methods used to record tooth movement and position, as evidence of successful orthodontic planning and treatment

*Retention:* definition; physiology; reasons for provision; consideration of provision; retention regimes

*Adult orthodontics:* possible difficulties encountered; orthodontics in conjunction with restorative dentistry

### 4 Understand the principles of active orthodontic therapy regimes

*Simple removable appliance therapy:* principles; modes of action; indications and contra-indications; advantages and disadvantages; progress monitoring

*Fixed appliance therapy:* principles; indications for usage; advantages and disadvantages; treatment planning; fixed appliance systems, orthodontic implants

*Functional appliance therapy:* principles of application; mode of action; scope; indications and contra-indications

*Anchorage:* definition; concept (applied force, reaction force); types of anchorage (simple, compound, stationary, reciprocal); anchorage loss; factors affecting anchorage

*Extra-oral anchorage and traction:* purpose; distinction between extra-oral anchorage (EOA) and extra-oral traction (EOT)

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 explain the rationale for orthodontic treatment [IE1, IE2, CT2] | M1 discuss factors that can influence the success or failure of orthodontic treatment | D1 evaluate the benefits, disadvantages and potential risks associated with undertaking orthodontic treatment |
| P2 describe the stages in the formation of an ideal occlusion [CT1] | | |
| P3 describe Angle's classification of malocclusion | | |
| P4 explain orthodontic tooth movement and how these movements are recorded | M2 discuss how variations in the use of applied forces can influence orthodontic tooth movement | D2 evaluate the difficulties encountered when undertaking adult orthodontic treatment, with the emphasis on tooth movement |
| P5 explain the physiological process of orthodontic tooth retention | M3 justify the need for orthodontic tooth retention | D3 evaluate the reasons for utilisation of different categories of orthodontic tooth retention regimes and their effectiveness |
| P6 explain the principles of simple removable, fixed and functional orthodontic therapy regimes | M4 justify the influence that the modes of action of the three principal forms of orthodontic therapy have on the treatment regime undertaken | D4 evaluate the effectiveness of the modes of action of the three principal forms of orthodontic therapy in correcting malocclusion |
| P7 assess the use of various types of orthodontic anchorage | M5 discuss factors that affect orthodontic anchorage | D5 differentiate between extra-oral anchorage (EOA) and extra-oral traction (EOT) |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| | |
|---|---|
| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |

# Essential guidance for tutors

## Delivery and assessment guidance

Learners will need access to examples of aids to treatment planning, orthodontic appliances and both laboratory produced and clinical components. Access to a clinical environment or resources such as video, typodonts and other types of instructional models would be advantageous when studying the theory of orthodontics.

## Delivery

This unit is designed to give learners a general level of knowledge and understanding of normal and abnormal tooth eruption, occlusion and malocclusion and the different techniques and regimes that can be employed to correct and modify these by controlled tooth movement.

Tutors delivering this unit should consider integrating the delivery, private study and assessment relating to this unit with other relevant units that form part of the programme of study. The learning outcomes of this unit are closely linked to *Unit 14: Design, Manufacture and Modification of Orthodontic Appliances.* They also require knowledge acquired from the study of *Unit 3: Dental Anatomy, Physiology and Disease.*

It is envisaged that formal teaching will be used at the outset of each topic area, involving the use of associated theory and understanding to form links with *Unit 15: Advanced Dental Technology Techniques and Procedures.*

Assignments structured around each learning outcome will enable learners to expand and develop their understanding of each specific topic area.

A wide range of delivery methods and media, including lectures, question and answer discussion and video, should be used to stimulate and motivate learners. Research using the internet and library resources would be suitable methods of information retrieval. Literature and product descriptions from orthodontic supply and manufacturing companies would be an excellent source of information. Visiting specialist speakers could add to the relevance of the subject for learners. Some clinical observation would also be invaluable, although not always practicable.

Learning outcome 1 is likely to be delivered through lectures, discussion, independent research, discussion of factual or fictional case studies and recognised methods/systems for recording treatment progress, i.e. radiographs, study models and photographs of abnormalities and corrections. Learning outcome 1 will introduce learners to the rationale for orthodontic therapy, from which they can develop a sound understanding of orthodontic theory. Learners will look at the scope and limitations of individual orthodontic treatment regimes, together with the advantages and disadvantages, and potential risks and benefits associated with evidence-based treatment.

Learning outcome 2 covers the theory and features of ideal occlusion and classification of malocclusion. The aetiology of malocclusion will be explored, including skeletal, soft tissue and local factors, revisiting the theory of tooth eruption as introduced in *Unit 3: Dental Anatomy, Physiology and Disease*.

Delivery of this learning outcome could include formal lectures, formative exercises and self-supported learning. The learning experience would be greatly enhanced by periods of clinical observation. Where this is not practicable, learners should have access to a range of anatomical models. High quality audio-visual materials should also be used to describe and illustrate occlusion and malocclusion that cannot be visualised by other means.

Learning outcome 3 covers the principles of physiological tooth movement under the influence of applied forces, the application of forces and the recording of tooth movements. The physiology and regimes of orthodontic retention will also be covered. There is a growing call for adult orthodontics. Learners will gain an insight into the difficulties posed by adult orthodontics, and how orthodontics and restorative dentistry can complement each other.

Learning outcome 4 will provide learners with knowledge of the principles and concepts of the three primary orthodontic therapy regimes, the reasons and considerations for the provision of retention, and an introduction to the concepts and provision of anchorage and traction. This Learning outcome has close links to *Unit 14: Design, Manufacture and Modification of Orthodontic Appliances*.

Delivery methods are likely to include formal lectures, tutorials, internet research, the use of factual or fictional case studies to promote discussion and independent learner research.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Introduction to the unit and structure of the programme and assignments | 1 |
| **Learning outcome 1** | |
| *Understand the rationale for orthodontic therapy* | |
| Theory introducing orthodontics: | 1 |
| Need for treatment, the scope and limitations of orthodontic therapy based on evidence | 2 |
| Theory outlining principles of treatment planning including a practical related to treatment planning, cephalometrics, IOTN | 2 |
| Theory covering factors related to the success of orthodontic treatment; common causes of treatment failure; dental health | 2 |
| Discussion of associated benefits, disadvantages, risks and complexity of orthodontic treatment | 1 |
| **Assignment 1: Why do you need orthodontic treatment?** (P1, M1, D1) | 4 |
| **Learning outcome 2** | |
| *Know the theory and features of occlusion* | |
| Theory related to eruption patterns of deciduous and permanent teeth | |
| Theory of eruption related to occlusion (linked to *Unit 3*) | |
| Theory outlining occlusion/malocclusion | 2 |
| Theory and practical exercises related to classification of malocclusion | 1 |
| Theory describing mal-position of individual teeth and mal-relationship of the dental arches | 1 |
| Theory input examining disorders related to malocclusion | 1 |
| **Assignment 2: Occlusion and malocclusion, the foundation of orthodontics** (P2, P3) | 5 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 3** | |
| *Understand the theory of physiological tooth movement and retention in the human dentition* | |
| Theory covering physiological changes of tooth supporting and related tissues during tooth movement | 1 |
| Theory to examine the factors that influence tooth movement, and the application of force to achieve tooth movement | 1 |
| Theory to examine tooth retention and retention regimes | 1 |
| Theory and practical exercises related to recording tooth movement: methods used to record tooth movement and position, as evidence of successful orthodontic planning and treatment (linked to learning outcome 1) | 1 |
| Theory covering possible difficulties encountered when treating adults Theory examining orthodontics in conjunction with restorative dentistry | 2 |
| **Assignment 3: A study of the principles of orthodontic tooth movement and retention** (P4, P5, M2, M3, D2, D3) | 6 |
| **Learning outcome 4** | |
| *Understand the principles of active orthodontic therapy regimes* | |
| Theory covering simple removable appliance therapy: principles; modes of action; indications and contra-indications; advantages and disadvantages; progress monitoring | 2 |
| Theory examining fixed appliance therapy: principles; indications for usage; advantages and disadvantages; treatment planning; fixed appliance systems | 2 |
| Theory related to functional appliance therapy: principles of application; mode of action; scope; indications and contra-indications | 2 |
| Theory covering retention: definition; reasons for provision; consideration of provision; retention regimes | 1 |
| Theory of anchorage: definition; concept (applied force, reaction force); types of anchorage (simple, compound, stationary, reciprocal); anchorage loss; factors affecting anchorage | 1 |
| Theory relating to extra-oral anchorage and traction: purpose; distinction between extra-oral anchorage (EOA) and extra-oral traction (EOT) | 1 |
| **Assignment 4: Orthodontic therapy regimes: removable, fixed and functional orthodontic therapy** (P6, P7, M4, M5, D4, D5) | 5 |
| **Total learning time hours** | **50** |

## Assessment

Most of the evidence for this unit will be generated from a series of assignments designed to encompass the documented grading criteria for each of the four learning outcomes. Further evidence will be generated and documented by viva voce where appropriate. It is suggested that **one** assignment is designed to cover **one** learning outcome. The material for these assignments will be gained by formal study, and from information researched and collated during private study. The assignments can be stand-alone or integrated with the contents of other units that form links within the general framework of study.

However, with integrated assignments, care should be taken to ensure that learners meet the assessment criteria for each unit and that they record this appropriately.

To achieve a **pass** grade, learners must achieve **all seven** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all five** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all five** distinction criteria as outlined in the grading grid.

For P1, learners are expected to explain the rationale for orthodontic therapy. This will include information about the prevalence of malocclusion, demand for treatment, need for treatment (IOTN), dental health and psychological wellbeing. The evidence could be presented as an individually written document, a formal presentation **or** form part of a structured assignment that encompasses M1 and D1 to satisfy learning outcome 1.

P2 requires learners to describe the stages in the formation of an ideal occlusion and to consider tooth eruption, bone growth, and external factors such as diet and habits. Evidence may be in the same format as for P1.

For P3, learners are required to show and describe Angle's classification of malocclusion. Evidence may be in the same format as for P1.

P4 requires learners to explain the biological process of orthodontic tooth movement and methods employed to record these movements; physiological changes in the supporting tissues and application of forces. The evidence could be presented as for P1 **or** form part of a structured assignment that encompasses M2 and D2 to satisfy part of learning outcome 3.

P5 requires learners to explain the physiological changes that occur in the oral tissues during orthodontic tooth retention. The evidence could be presented as for P1 **or** form part of a structured assignment that encompasses M3 and D3.

P6 covers the three main forms of orthodontic therapy: simple removable therapy, fixed therapy and functional therapy. Learners must explain the principles relating to modes of action and the advantages and disadvantages of each type of therapy.

For P7, learners are required to assess the use of various types of anchorage which should include simple, reciprocal, complex, inter and intra maxillary. This could take the form of a written document, which defines anchorage and outlines the various types of anchorage. (This information can be used as a foundation for M6 M5 and D5.)

M1 requires learners to discuss the factors that influence the success or failure of orthodontic treatment. Evidence produced for P1 can be expanded upon and discussed in greater detail, taking into account other factors such as treatment

planning, patient cooperation and patient suitability. Evidence could be presented as for P1 **or** form part of a structured assignment that encompasses D1 to satisfy learning outcome 1.

For M2, learners are required to discuss how variations in the use of applied forces can influence and affect orthodontic tooth movement. Evidence could be in the form of a written document or presentation. Evidence must make reference to the type of therapy used, the direction of applied force and the strength of applied force. Evidence should be presented as an individually written document **or** form part of a structured assignment that encompasses D2 to satisfy part of learning outcome 3.

For M3, learners must adapt and expand the evidence documented in P5 to explain the physiological process and justify the need for orthodontic tooth retention. (The information can be used as a precursor to D3.)

M4 requires learners to justify the influence that the modes of action of the three principal forms of orthodontic therapy have on the treatment regime undertaken. Such factors as tooth movement required, single arch or both, and skeletal classification must be discussed. Evidence could be presented as an individually written document **or** form part of a structured assignment that encompasses D4 to satisfy **part of** learning outcome 4.

M5 requires learners to discuss factors that affect orthodontic anchorage; the evidence for P7 could be adapted and expanded to form part of this criterion. (The information can be used as a precursor to D5.) Evidence could be presented as an individually written document **or** form part of a structured assignment that encompasses D5.

For D1, learners are required to fully evaluate the benefits, disadvantages and potential risks associated with the various forms of orthodontic treatment. The information must encompass root resorption, loss of periodontal support, decalcification, soft tissue damage and TMJ dysfunction. Evidence generated for P1 and M1 can be used and expanded. Evidence could be presented as an individually written document or a formal presentation.

For D2, learners are required to evaluate the difficulties that could be encountered when adults undertake orthodontic treatment. Emphasis must be placed on tooth movement, cell regeneration and reduced vascularity. The evidence could be presented as an individually written document **or** combined with evidence from P4 and M2 to form part of a structured assignment to fulfil part of the requirements of learning outcome 3.

D3 requires learners to evaluate the different categories of orthodontic retention (short term, medium term, long term), the reasons for use of these different regimes and their effectiveness. Evidence could be presented as an individually written document **or** combined with evidence from P5 and M3 to form part of a structured assignment.

D4 requires learners to evaluate the effectiveness of the modes of action of the three principal forms of orthodontic therapy in correcting malocclusion, i.e. the systems/methods employed to physically move the teeth. Evidence could be presented as an individually written document **or** combined with evidence from P6 and M4 to form part of a structured assignment.

For D5, learners are required to explain the purpose, principles and distinct differences between extra-oral anchorage (EOA) and extra-oral traction (EOT). The evidence could be presented as an individually written document or combined with evidence from P7 and M5 to form part of a structured assignment.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, M1, D1 | Why do you need orthodontic treatment? | The orthodontic practice that most of your work comes from has asked you to give a presentation to a group of their new dental nurses. This is to help them explain to patients the need for orthodontic treatment, what the patient and dental team can do to ensure its success, and the benefits and problems that may arise during or after treatment. | • Formal multimedia presentation to peers and/or report |
| P2, P3 | Occlusion and malocclusion, the foundation of orthodontics. | The correction of malocclusion is the reason for orthodontic treatment. You are asked to write a report for publication in an oral health booklet, for your local health centre. It will explain to the public what malocclusion is, how it may be identified and the factors that can cause it. | • Written report in the form of a booklet |
| P4, P5, M2, M3, D2, D3 | A study of the principles of orthodontic tooth movement and retention | The science behind tooth movement and retention is always being updated as new discoveries are made. A dental study group that you contribute to has asked you to do a presentation on the physiological aspect of tooth movement in orthodontics, and the retention required post treatment, highlighting the potential difficulties in treatment for the increasing number of adult patients. | • ICT presentation and/or supporting written report<br>• Report or magazine article |

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P6, P7, M4, M5, D4, D5 | Orthodontic therapy regimes: removable, fixed and functional orthodontic therapy | The GDC has asked you for a submission for its magazine describing the treatment regimes and the appliances available from the orthodontic team. The article should be broad ranging in content and technical detail, so as to interest all members of the dental team. | • Report or magazine article |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
| --- |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 6: Dental Public Health and Preventative Dentistry |
| Unit 11: Complex Dental Materials Science |
| Unit 14: Design, Manufacture and Modification of Orthodontic Appliances |

## Essential resources

This unit should be delivered by occupationally competent lecturers who can, where appropriate, link the theoretical aspects of this unit to the production of custom-made dental devices in associated practical units. Learners will need access to a range of specialist visual aids, natural and simulated human teeth, other appropriate anatomical models. Adequate library resources should be available with access to ICT facilities, the internet and a range of appropriate journals.

## Employer engagement and vocational contexts

Employers should be approached to provide subject-specific expertise and laboratory cases for discussion. Clinicians may be approached to deliver parts of the unit or to provide opportunities for learners to view live cases.

All the content of this unit should be presented from a vocational context where possible.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE1,2] Researching the subject areas that are covered in the written assessments |
| Creative thinkers | [CT1,3,4] Presenting assignment work related to the criteria being assessed |
| Reflective learners | [RL4,5,6] Presenting conclusions relating to written and presentation assessments |
| Self-managers | [SM2,3,6] Managing study and research time, and completing assessment tasks by predetermined deadlines |
| Effective participators | [EP2,3,4] Presenting and defending research and conclusions related to assessed presentation |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE1,2,3,6] Using reasoned arguments to support answers during group discussions as part of learning activities |
| Creative thinkers | [CT1,2,4,6] Presenting personal or group work using various media, and when completing class-based learning exercises |
| Reflective learners | [RL1,3,4,5,6] Examining feedback from assessment work, or group discussions |
| Team workers | [TW1,2,3,4,5] Working with groups, or having to work with limited resources |
| Self-managers | [SM2,3,5,6] Managing their time efficiently to produce non assessed work |
| Effective participators | [EP1,2,4,5] Investigating new concepts, questioning theory or other learners' ideas in an effective and balanced way, during class discussions |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Researching all parts of assessed work; using the internet; word processing |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Researching all parts of assessed work; using the correct multimedia tools to present work |
| Manage information storage to enable efficient retrieval | Planning and presenting assessed work |
| Follow and understand the need for safety and security practices | |
| Troubleshoot | |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Researching all aspects of the unit either for personal study or assessed pieces of work |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Researching all aspects of the unit either for personal study or assessed pieces of work |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | When preparing research to be presented either as class activities or assessed pieces of work |
| Bring together information to suit content and purpose | Compiling research information and preparing it for class presentation or in the form of assessed written work |
| Present information in ways that are fit for purpose and audience | Participating in class presentations of research or ideas, or producing other forms of assessed work |
| Evaluate the selection and use of ICT tools and facilities used to present information | |

| Skill | When learners are… |
|---|---|
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Using any internet bases discussion group or forum to discuss ideas with peers and tutors<br>Using college virtual learning environment to store retrieve or communicate information to other learners or tutors |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Working in groups or as individuals and participating in the discussion of ideas and concepts |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Compiling research information and preparing it for class presentation or in the form of assessed written work |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Presenting written assessment tasks linked to grading criteria |

# Unit 14: Design, Manufacture and Modification of Orthodontic Appliances

**Unit reference number:** M/505/9595

**Level:** 3

**Credit value:** 15

**Guided learning hours:** 86

## Unit Aim

The aim of this unit is for learners to understand the design principles of removable and fixed orthodontic appliances, and using these principles acquire the skills to manufacture and modify these appliances.

## Unit introduction

Over the years, orthodontic trends have changed both in materials and types of appliances that are used. This unit focuses on a range of orthodontic appliances and investigates their manufacture, design and modification.

Learning outcomes 1 and 2 introduce learners to a range of removable appliances that are commonly prescribed for patients. They will learn the design principles and construction techniques for active, functional and retaining appliances.

As fixed appliance treatment becomes more popular with orthodontists, learning outcomes 3 and 4 look at different forms of fixed appliance treatment. Learners will be introduced to both clinically applied and laboratory constructed fixed appliances. They will look at the functions of fixed appliances and their construction techniques.

The need to repair existing orthodontic appliances is fundamental to ensuring that treatment is not compromised, and learning outcome 5 focuses on this. Learners will investigate the need to repair and modify existing orthodontic appliances and the reasons for component and material failure.

Because an understanding of the principles and rationale of orthodontic treatment is necessary in order to fully understand the design of appliances fully, this unit should be taught after or alongside *Unit 13: Orthodontic Therapy Principles*.

## Learning outcomes

### On completion of this unit a learner should:

1. Understand the design principles of removable orthodontic appliances
2. Be able to manufacture removable orthodontic appliances
3. Understand fixed orthodontic appliances
4. Be able to manufacture laboratory constructed fixed orthodontic appliances
5. Be able to repair and modify orthodontic appliances

## Unit content

### 1 Understand the design principles of removable orthodontic appliances

*Active appliance design:* principles of general removable appliance design and manufacture that are fit for purpose and adhere to standards; evaluating techniques and technology; base-plate and bite plane design; designs of the currently used active components e.g. Z Spring, Palatal Finger Spring, Buccal Canine Retractor; design of passive components, e.g. Adams Cribs, Southend clasp; actions and function of each active component

*Functional appliance design:* principles of functional appliance design; designs of functional appliances, e.g. Twin Block Bite raising splints; the uses and function of functional appliances; limitations of functional appliances; how forces and tooth movement may be directed in the design of a functional appliance; modifications and adjustments to the Twin Block; retention of functional appliances

*Retainer appliance design:* design of orthodontic retainers, e.g. Hawley Retainer, Essix Retainer; retention of retainer appliances; minor tooth movement using orthodontic retainers

### 2 Be able to manufacture removable orthodontic appliances

*Active orthodontic appliances:* prescriptions and study models; construction of commonly used active components; positioning components; selection of materials for components; methods of activation of components; base-plate construction methods; health and safety; relevant codes of practice; cleaning and care for removable appliances; appropriate management and use of equipment and tools; polishing and finishing techniques; delivery of work to patient

*Functional orthodontic appliances:* prescriptions; construction techniques for functional appliances, e.g. Twin Block; relevant codes of practice; cleaning and care for removable appliances; equipment and tools used; polishing and finishing techniques; delivery of work to patient

*Orthodontic retaining appliances:* prescriptions; pressure formed retainer splints and techniques for construction, construction techniques for commonly used retainers, e.g. Hawley Retainer; relevant codes of practice; cleaning and care for removable appliances; equipment and tools used; polishing and finishing techniques; delivery of work to patient

### 3 Understand fixed orthodontic appliances

*Fixed appliance design:* forms of commonly used fixed appliances; functions of clinically constructed fixed appliances, e.g. Begg, Edgewise; functions of laboratory constructed fixed appliances, e.g. Trans-palatal Arch, Quad Helix; advantages and limitations of fixed appliances

### 4 Be able to manufacture laboratory constructed fixed orthodontic appliances

*Fixed orthodontic appliances:* prescriptions; construction techniques for fixed appliances, e.g. Trans-palatal Arch, Nance Button; soldering and welding techniques; care and maintenance of fixed appliances; equipment and tools used; polishing and finishing techniques; delivery of work to patient; health and safety; relevant codes of practice; improvement through feedback

**5 Be able to repair and modify orthodontic appliances**

*Repair:* reasons for component failure; forms of permanent repair both to acrylic and wire component; techniques for repairing base-plates; effects of repairs to base-plates and components; health and safety; relevant codes of practice; decontamination and infection control; meeting needs of the patient

*Modification:* reason to modify an existing orthodontic appliance; types of modifications; communication with colleagues; attachment of artificial teeth; meeting needs of the patient

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 explain the design principles of a range of different removable orthodontic appliances and their components [CT2, IE2] | M1 assess the construction principles of removable orthodontic appliance components | D1 critically evaluate the different functions of removable orthodontic appliance designs |
| P2 manufacture a range of removable orthodontic appliances that are fit for purpose, from given prescriptions [CT5,6, SM3] | M2 discuss the processes required to manufacture removable orthodontic appliances from a given prescription | D2 evaluate the effectiveness of a manufactured removable orthodontic appliance against a given prescription |
| P3 assess the design principles used for clinically and laboratory constructed fixed appliances [CT2, IE2] | M3 discuss the functions of clinically and laboratory constructed fixed appliances | |
| P4 manufacture laboratory constructed fixed orthodontic appliances that are fit for purpose, from given prescriptions [CT5,6, SM3] | M4 discuss the processes required to manufacture laboratory constructed fixed orthodontic appliances that are fit for purpose from a given prescription | D3 evaluate the effectiveness of a manufactured laboratory constructed fixed orthodontic appliance against a given prescription |
| P5 explain the circumstances under which repairs and modifications might be required for an existing orthodontic appliance [CT2, IE2] | M5 discuss the relationship between the techniques used and the circumstances under which a repair and modification of an orthodontic appliance might occur | D4 justify processes that the technician and patient employ to ensure the longevity of an orthodontic appliance |

| Assessment and grading criteria | | | | | |
|---|---|---|---|---|---|
| P6 | perform repairs to fractured removable orthodontic appliances that are fit for purpose, from given prescriptions [CT5,6, SM3] | M6 | discuss the processes required to repair fractured removable orthodontic appliances from given prescriptions | D5 | evaluate the effectiveness of the repairs to a fractured removable orthodontic appliance against a given prescription |
| P7 | modify existing orthodontic appliances that are fit for purpose, from given prescriptions [CT5,6, SM3] | M7 | discuss the processes required to modify existing orthodontic appliances from given prescriptions | D6 | evaluate the effectiveness of the modification of an orthodontic appliance against a given prescription |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |
|---|---|

# Essential guidance for tutors

## Delivery and assessment guidance

The learner should have access to a range of appliances and appliance designs. The delivery should be carried out in a laboratory environment, with access to live cases where possible. Clinical visits and demonstrations will enhance the understanding of the term 'clinically acceptable'. Live demonstrations, videos, and the internet are essential tools when delivering this unit. All practical work should be produced to a clinically acceptable standard, using all health and safety and quality assurance requirements.

## Delivery

Tutors delivering this unit have opportunities to use a wide range of techniques, including lectures, discussions, seminar presentations, demonstrations, supervised practical activities, research using the internet and/or library resources and personal and/or laboratory experience. Delivery should provide a sound understanding of orthodontic treatment and the appliances used to achieve such treatment. It should motivate learners to investigate orthodontics and its different appliances and theories.

Work placements should be monitored regularly to ensure the quality of the learning experience. It would be beneficial for learners and supervisors to be made aware of the requirements of this unit prior to any work-related activities, so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to produce a range of simple orthodontic appliances following onto more complex and more challenging orthodontic appliances and they should be encouraged to collect record sheets with supervisor comments regarding quality and standard.

Whichever delivery method is chosen it is vital that tutors stress the importance of patient welfare, accuracy, quality and importance of dental techniques.

Health and safety issues relating to working in a dental laboratory environment must be stressed and regularly reinforced, and risk assessments must be undertaken prior to practical activities. Adequate PPE must be provided and used when undertaking practical work.

Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may also be taking as part of the programme of study.

Learning outcomes 1 and 2 are directly linked. These are likely to be delivered through formal lectures, discussions, demonstrations, supervised practical activities and independent learner research. Learners will need to be aware of the aims of orthodontic treatment (Unit 13), design and construction methods of a range of removable orthodontic appliances, and the function of these appliances.

Clinicians and technicians specialising in treatment planning, appliance design and construction can all add another perspective for learners. Dental supply companies can introduce new products which are relevant to removable orthodontic appliances and any new developments in the techniques and materials used in orthodontics.

Learning outcomes 3 and 4 are directly linked and cover the design principles and manufacture of fixed orthodontic appliances. Learners should also be introduced to the principles of extra oral traction. The tutor could show and demonstrate a range of laboratory constructed fixed orthodontic appliances, and the methods of construction.

Delivery techniques could include formal lectures, practical demonstrations, supervised practical activities and informal discussions with reflection and feedback. Speakers relevant to fixed orthodontic treatment can be invited to show, discuss and demonstrate fixed appliance treatment. Visits to orthodontic laboratories or clinics can show the practical application of orthodontic treatment.

Learning outcome 5 introduces learners to the correct methods for repairing and modifying orthodontic appliances. Delivery techniques could include formal lectures, practical demonstrations and supervised construction practicals. Visits to orthodontic laboratories or clinics can show the practical application of orthodontic treatment.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| Introduction to the unit and structure of the programme and assignments | 2 |
| **Learning outcome 1** | |
| *Understand the design principles of removable orthodontic appliances* | |
| Investigate the theory covering principles of design, action and function of each active component | |
| • general active removable appliance design | 2 |
| • base-plate and bite plane design | 2 |
| • designs of the currently used active components, e.g. Z Spring, Palatal Finger Spring, and Buccal Canine Retractor | 6 |
| Consider the theory of design of passive components, e.g. Adams Cribs, Southend clasp | 2 |
| Consider the theory of the actions and function of each passive component | 2 |
| *Theory input related to:* | |
| • the principles of functional appliance design; designs of functional appliances, e.g. Twin Block; retention of functional appliances<br>• the uses and function of functional appliances<br>• limitations of functional appliances<br>• how forces and tooth movement may be directed in the design of a functional appliance | 5 |
| • modifications and adjustments to the Twin Block | |
| Investigate the theory covering retainer appliance design: design of orthodontic retainers, e.g. Hawley Retainer, Essix Retainer; retention of retainer appliances; minor tooth movement using orthodontic retainers | 4 |
| Personal research and study time | 4 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 2** | |
| *Be able to manufacture removable orthodontic appliances* | |
| Theory and practical demonstrations encompassing construction of commonly used components, e.g. Adams Cribs, Southend clasps, Z Spring, Palatal Finger Spring, Buccal Canine Retractor, Roberts retractor, labial bows | 15 |
| • base-plate construction methods | 2 |
| • polishing and finishing techniques | 2 |
| • equipment and tools used | 2 |
| • cleaning and care for removable appliances | 1 |
| Theory covering health and safety; Medical Devices Regulation (MDR); relevant current legislation and codes of practice | 2 |
| *Functional orthodontic appliances:* | |
| Theory and practical presentations and exercise related to construction techniques for functional appliances, e.g. Twin Block | 7 |
| *Orthodontic retaining appliances:* | |
| Theory and practical covering the techniques for construction of:<br>• pressure formed retainer splints<br>• commonly used retainers, e.g. Hawley Retainer, Begg etc. | 2<br>2 |
| Personal study and research time | 3 |
| **Assignment 1: Removable appliance design, function and construction** (P1, M1, D1, P2, M2, D2) | 8 |
| **Learning outcome 3** | |
| *Understand fixed orthodontic appliances* | |
| Theory and demonstrations related to fixed appliance design: | |
| • forms of commonly used fixed appliances | 4 |
| • functions of laboratory constructed fixed appliances, e.g. Trans-palatal Arch, Quad Helix | 3 |
| • functions of clinically constructed fixed appliances, e.g. Begg, Edgewise | 2 |
| • advantages and limitations of fixed appliances | 1 |
| • extra-oral traction in fixed appliance treatment | 1 |
| Personal study and research time | 2 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 4** | |
| *Be able to manufacture laboratory constructed fixed orthodontic appliances* | |
| Practical exercise and demonstrations related to fixed orthodontic appliances: | |
| • construction techniques for fixed appliances; Trans-palatal Arch, Lingual Arch, Nance Button, Quad Helix | 4 |
| • soldering and laser welding techniques | 2 |
| • polishing and finishing techniques | 1 |
| • equipment and tools used health and safety | |
| Theory supporting the care and maintenance of fixed appliances and delivery of work to patient | 2 |
| **Assignment 2: Fixed appliance design, function and construction** (P3, M3, P4, M4, D3) | 20 |
| **Learning outcome 5** | |
| *Be able to repair and modify orthodontic appliances* | |
| *Repair:*<br>Theory presentation of forms of permanent repair to acrylic and wire components | 2 |
| Theory outlining the reasons for component failure | 2 |
| Theory covering handling of repairs in terms of health and safety, decontamination and infection control; Medical Devices Regulation (MDR); relevant current legislation and codes of practice | 2 |
| Practical demonstration and exercises practising repairs to base-plates and wire components | 4 |
| *Modification:* | |
| Theory related to the reasons to modify an existing orthodontic appliance | 2 |
| Types of modifications; attachment of artificial teeth | 2 |
| Practical tasks linked to theory, modification and communication of patient needs | 3 |
| Personal study and research time | 2 |
| **Assignment 3: Repairing and modifying orthodontic appliances** (P5, M5, D4, P6, M6, D5, P7, M7, D6) | 8 |
| **Total learning time hours** | **144** |

## Assessment

All practical work should be produced to a clinically acceptable standard, and adhere to all health and safety and quality assurance requirements.

To achieve a **pass** grade, learners must achieve **all seven** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all seven** merit criteria as outlined in the grading grid.

To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all six** distinction criteria as outlined in the grading grid.

P1 requires learners to explain the design principles of a range of different removable appliances and their components. Learners must explain the different components of removable appliances and which appliance they are appropriate to, as listed in unit content, learning outcome 1. Evidence for this could take the form of a written report, an oral presentation (possibly using appropriate software), short answer questions, or a leaflet/booklet.

For P2, learners must manufacture a range of removable orthodontic appliances to a clinically acceptable standard, from given prescriptions, using all health and safety and quality assurance requirements listed in unit content, learning outcome 2. Learners need to produce at least three appliances with examples of the most common components and baseplate designs incorporated in them. The criterion could be assessed by submitting practical pieces of work for formal assessment or directly observed by the tutor during practical activities. Suitable evidence for the latter would be observation records completed by learners and the tutor. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor. Guidance on the use of observation records and witness statements is provided on our website.

For P3, learners are expected to assess the design principles of clinically and laboratory constructed fixed appliances. Learners are expected to describe the different designs and components that make up the various types of fixed appliances. Evidence may be in the same format as for P1.

P4 requires learners to manufacture a range of laboratory constructed fixed appliances to a clinically acceptable standard and from a given prescription, using all health and safety and quality assurance requirements listed in unit content, learning outcome 4. Evidence may be in the same format as for P2.

For P5, learners are expected to explain the circumstances under which repairs and modifications might be required for an existing orthodontic appliance and explain the reason for orthodontic component failure. Evidence may be in the same format as for P1.

P6 requires learners to perform repairs to a fractured removable orthodontic appliance from a given prescription, to a clinically acceptable standard, using all health and safety and quality assurance requirements. Evidence may be in the same format as for P2.

P7 requires learners to modify an existing orthodontic appliance to a clinically acceptable standard, from a given prescription, using all health and safety and quality assurance requirements. Evidence may be in the same format as for P2.

For M1, learners must assess the construction principles of removable appliances. Learners need to show an understanding of the design principles of a range of different component parts from a range of orthodontic appliances which are listed in unit content, learning outcome 1. The situation may be the same as that used to provide evidence for other criteria. Evidence could take the form of a written report, oral presentation (possibly using appropriate software), or short answer questions.

M2 requires learners to discuss the processes required to manufacture removable orthodontic appliances from a given prescription. They should include details of component manufacture, base plate materials, build-up techniques, trimming and polishing. Evidence may be in the same format as for M1.

For M3, learners must discuss the functions of fixed appliances, showing that they understand the functions and purpose of fixed appliance treatment. The situation may be the same as that used to provide evidence for other criteria. It may be directly linked to P3. Evidence may be in the same format as for M1.

M4 requires learners to discuss the processes required to manufacture laboratory constructed fixed orthodontic appliances from a given prescription. This may include band positioning, taping, spot welding, laser welding, soldering and metal finishing techniques. Evidence may be in the same format as for M1.

For M5, learners must discuss the relationship between the techniques used to repair and modify an orthodontic appliance and the circumstances under which the repair or modification of the appliance might occur. Learners are required to explain the methods of repairing fractured and failed wire components, along with how an existing orthodontic appliance can be modified. They also need to give reasons why you would modify an orthodontic appliance. Evidence may be in the same format as for M1.

For M6, learners need to discuss the processes required to repair fractured removable orthodontic appliances from given prescriptions. They should include details of trimming, positioning, materials used and processing techniques. Evidence may be in the same format as for M1.

For M7, learners need to discuss the processes required to modify existing orthodontic appliances from given prescriptions. This may include details of tooth additions, conversion from active to passive appliances, addition of bite planes etc. Evidence may be in the same format as for M1.

D1 requires learners to critically evaluate the different functions of removable appliances. Learners are expected to assess their retention, anchorage, components fit, design of components and their fitness for purpose. The situation may be the same as that used to provide evidence for other criteria. Evidence may be in the same format as for M1.

For D2, learners must evaluate the effectiveness of a manufactured removable orthodontic appliance against a given prescription. Learners should look at examples of manufactured work and evaluate how well designed and manufactured the component parts are, and how effective their function will be. Evidence may be in the same format as for M1.

For D3, learners must evaluate the effectiveness of a manufactured laboratory constructed fixed orthodontic appliance against a given prescription. Evidence may be in the same format as for M1.

For D4, learners need to justify processes that the technician and patient can employ to ensure the longevity of an orthodontic appliance, and explain any cross-infection controls that are relevant when receiving an orthodontic appliance. The situation may be the same as that used to provide evidence for other criteria. Evidence may be in the same format as for M1.

For D5, learners must evaluate the effectiveness of the repairs to a fractured removable orthodontic appliance against a given prescription. They need to assess the standard of the repair and the fitness for purpose of the appliance post repair. Evidence may be in the same format as for M1.

For D6, learners must evaluate the effectiveness of the modification of an orthodontic appliance against a given prescription, assessing how the appliance functions post repair compared to the ideal. Evidence may be in the same format as for M1.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, M1, D1, P2, M2, D2 | Removable appliance design, function and construction | A national orthodontic laboratory chain requires a manual to explain the design theory and function of the orthodontic appliances they supply; they have asked you to produce it. To support this they would like you to construct examples of these appliances. | • Report and practical tasks |
| P3, M3, P4, M4, D3 | Fixed appliance design, function and construction | The local hospital has asked you to produce a guide for all dental team members discussing both clinical and laboratory produced fixed orthodontic appliances. Laboratory constructed examples have been requested to accompany the guide. | • Report and practical tasks |
| P5, M5, D4, P6, M6, D5, P7, M7, D6 | Repairing and modifying orthodontic appliances | The laboratory you work for is experiencing a higher than normal number of returns from dentists due to appliance breakage. You have been asked to compile a report investigating how to reduce breakages and, if they do occur, how repairs and modifications are carried out in the laboratory. | • Report and practical tasks |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 5: Legislation, Professionalism and Ethics in Dentistry |
| Unit 9: Dental Laboratory Compliance |
| Unit 11: Complex Dental Materials Science |
| Unit 13: Orthodontic Therapy Principles |
| Unit 16: Work-based Learning in Dental Technology. |

## Essential resources

Facilities required for this unit include a suitable dental laboratory with appropriate seating and benching. The laboratory benching should be fitted with dust extraction for trimming acrylic and appropriate trimming hand pieces or a designated area should be provided. At least one fume extractor and hydro-flask is required for any acrylic work to be carried out. All correct pliers, wax tools and trimming burs will be needed to complete the practical aspect of this unit. Essential materials are dental plasters, orthodontic acrylic resin, dental waxes, orthodontic sprung stainless steel wire of various thicknesses, stainless steel tubing, molar bands, expansion screws, vacuum-formed material and silver solder to fulfil practical aspects of the learning outcomes.

Staff delivering this unit should be registered, competent and experienced dental technicians with an in-depth knowledge of the subject. Ideally they should have recent industrial experience within an orthodontic department or laboratory, or show evidence of regular contact with the industry.

## Employer engagement and vocational contexts

Close links with employers is essential. They can provide input by supplying cases for learners for the production of appropriate practical work. They can give presentations related to new techniques, health and safety and laboratory experiences. Assessment could be carried out in the workplace by employers. All the content of the unit should be presented from a vocational point of view.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE2] Carrying out research in connection with written assignment tasks; investigating alternative manufacturing procedures of appliances |
| Creative thinkers | [CT2,4] Discussing appliance design and planning either in a group during question and answer sessions, or via written work<br>[CT5,6] Carrying out manufacturing procedures |
| Reflective learners | [RL1,5] Evaluating and improving their own technical work<br>[RL6] Presenting conclusions relating to written and practical assessment |
| Team workers | [TW1,4] Working in the lab using shared resources to produce practical work within the required timescale |
| Self-managers | [SM3,6] Managing their time to produce written and practical work and being able to work efficiently when under pressure as in a commercial laboratory |
| Effective participators | [EP2] Presenting conclusions relating to written work and explaining alternative techniques for practical tasks |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE3] Exploring appliance design and treatment plans using radiographs, models and patient history |
| Creative thinkers | [CT5] Developing new or modified techniques to deal with manufacturing problems |
| Reflective learners | [RL1,3] Evaluating their own and others' practical work and giving positive feedback |
| Team workers | [TW1,4] Working with other learners to produce group presentations or practical work that requires the sharing of equipment |
| Self-managers | [SM3,5,6] Managing their time to produce written and practical work from this unit and others; under pressure and being expected to work efficiently as in a commercial laboratory |
| Effective participators | [EP1,2,4,5] Participating in group discussions about many of the concepts that are covered in this unit |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Planning and preparing written assessment work; researching all parts of assessed work; using the internet; and word processing |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Researching all parts of assessed work |
| Manage information storage to enable efficient retrieval | |
| Follow and understand the need for safety and security practices | |
| Troubleshoot | |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Planning and preparing written assessment work; researching work for a class discussion |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Using IOTN, cephalometrics and other diagnostic aids to collate information in the development of treatment plans and appliance designs |
| Bring together information to suit content and purpose | Collating information prior to the production of written assessed work |
| Present information in ways that are fit for purpose and audience | Preparing for group presentations and the production of written assessed work |
| Evaluate the selection and use of ICT tools and facilities used to present information | Preparing for group presentations and the production of written assessed work |

| Skill | When learners are… |
|---|---|
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Using a college virtual learning environment to store, retrieve or communicate information to other learners or tutors |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Discussing appliance design and production |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading background information to prepare for the various topic areas covered in the unit |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Preparing to produce assessed written work in the form of essays or reports |

# Unit 15: Advanced Dental Technology Techniques and Procedures

**Unit reference number:** T/505/9596

**Level:** 3

**Credit value:** 10

**Guided learning hours:** 70

## Unit Aim

This unit allows learners to investigate advanced dental technology procedures that are common place in dental technology. The focal points of this unit are precision attachments, dental implants and the use of digital technology to aid in the construction of custom-made appliances.

## Unit introduction

Dental technology is a rapidly developing profession with many new and advanced techniques and procedures used to form dental appliances. It is an essential part of this programme to ensure learners, upon completion, have a realistic knowledge of modern processes that are carried out in a modern dental laboratory environment.

This unit is a broad introduction to dental implantology, precision attachments and digital systems, including computer aided design and computer aided manufacture (CAD/CAM). It introduces learners to the clinical and technical aspects of advanced techniques used in the field of restorative dentistry.

As technical advances are introduced to dentistry, it is essential that individuals employed in dental technology have an opportunity to explore them to help them in their future employment. There are links with other units in this programme, including *Unit 9: Dental Laboratory Compliance, Unit 11: Complex Dental Materials Science, Unit 10: Design of Fixed Prosthodontics, Unit 12: Techniques for Manufacturing Fixed Prosthodontics, Unit 7: Removable Complete Prosthodontics* and *Unit 14: Design, Manufacture and Modification of Orthodontic Appliances*.

## Learning outcomes

**On completion of this unit a learner should:**

1. Understand the selection and use of dental implants
2. Know how to select and use semi precision and precision attachments
3. Understand the principles of modern digital dental systems

## Unit content

### 1 Understand the selection and use of dental implants

*Clinical aspects of dental implantology*: patient history; diagnostic stages; planning; imaging including radiographic and CT/MRI scanning techniques; quality of existing bone; site preparation; placement of implant; impression techniques; transfer of information; cross-infection control; healing process; temporisation; the role of the dental team

*Materials selection*: biocompatible implant materials; prevention of oral disease; abutment materials; substructure and superstructure materials; metals and metal-free materials

*Design, planning and selection*: different considerations for the range of dental technology disciplines, techniques and technologies; diagnostic procedures; communication with the clinical staff

*Technical procedures*: fixed prosthodontics; removable prosthodontics; orthodontics; diagnostic stages; stents; model requirements and articulation; special trays; abutment design and selection; superstructure fabrication; temporary fabrication

*Common systems*: range of applications; design of retentive systems; transverse screw retained; vertically screw retained; cementable superstructures; advantages and disadvantages of each system; technical skills required; staff training; additional equipment

### 2 Know how to select and use semi precision and precision attachments

*Clinical considerations for the use of precision attachments*: evaluation of options available; preparation designs; health of the oral environment; quality of abutment teeth and underlying supportive structures; patient education and dexterity; communication techniques with other dental team members; time and resource management

*Material selection*: mechanical, biological and physical requirements of alloys used in a range of situations; metal free restorations

*Design, planning and selection*: biomechanically sound design; intracoronal; extracoronal; screw retained; recoverable attachments; bar type attachments; ball retained attachments; the use of magnets; differing frictional attachments; combination appliances; telescopic abutments; CAD/CAM scanning and milling; preformed; plastic templates

*Technical procedures*: model fabrication to include articulation; the use of a parallelometer; CAD/CAM scanning and milling; investment and casting techniques; matrix stages; patrix stages; finishing procedures and checking fitness for purpose

*Common systems*: their application in relation to dental technology appliances and prescription requirements; professional responsibility and development of self and team

### 3 Understand the principles of modern digital dental systems

*Principles of digital systems*: computer-aided design and computer-aided manufacture used for biomechanically sound fixed and removable appliances; rapid prototyping, 3D printing and their uses; intra-oral digital scanning; material requirements

*Applications for manufacture of dental prosthesis and appliances*: 3D modelling; laser, contact and intra-oral scanning; 3D printing for models; milling systems; CAD/CAM imaging systems, including diagnostics; digital shade taking systems; industry software packages

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 explain the clinical procedures that are carried out during the treatment of patients requiring dental implants [IE] | M1 discuss the different roles of dental care professionals associated with implant restorative techniques | D1 analyse the material requirements associated with dental implants |
| P2 discuss the applications of dental implants | M2 compare different dental implant systems against the ideal requirements | D2 analyse dental implant systems used for appliances in dental technology disciplines |
| P3 explain the technical procedures used to fabricate implant supported appliances [CT] | M3 explain the technical procedures for implant supported restorations | D3 critically evaluate common techniques used in dental technology to produce implant supported restorations |
| P4 describe the clinical procedures that are carried out during the treatment of patients requiring semi precision and precision attachments | | |
| P5 describe the different attachment systems used in dental technology [IE] | | |
| P6 discuss the use of digital systems in clinical and technical dentistry | M4 justify the use of a CAD/CAM system to form dental restorations | D4 evaluate the advantages of using digital technology in the dental laboratory |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| | |
|---|---|
| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |

# Essential guidance for tutors

## Delivery and assessment guidance

The learning outcomes in this unit can be delivered using a variety of teaching methods and styles. Additional external teaching support will be essential to the delivery of this unit to introduce learners to a variety of advanced techniques. A range of formats can be used for assessment, including article writing, ICT presentations and leaflet production.

## Delivery

Tutors should use a range of techniques and resources to introduce learners to the advanced dental technology techniques and procedures currently available. Lectures, discussions, seminar presentations, practical evaluations, multimedia delivery, field trips, external speakers, engagement with supply companies, research using the internet, applications and/or library resources would all be suitable. Assessment from other units in this programme can be linked to this unit.

Dental laboratory owners, managers and supervisors should be made aware of the requirements of this unit to enable them to support learners in this complex area. For example, learners may require an opportunity to observe and discuss with their work-based mentor cases involving advanced procedures. Engagement with these techniques will need considerable support and guidance. Learners will also be required to interpret direct instructions from a prescription. Consideration should be given to the sharing of individual research through a group/class approach and using presentations, group seminars, hand-outs and discussions. This will encourage a broader dissemination of knowledge.

Whichever delivery methods are used, it is essential that tutors stress professional standards required for this type of dental discipline.

Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may be taking as part of the programme of study.

Learning outcome 1 is likely to be delivered through formal lectures, discussions and independent learner research. The use of multimedia, external speakers and field trips related to advanced techniques and technologies will enhance delivery of this unit.

Learning outcome 2 introduces learners to a range of systems associated with dental attachments. It could be delivered using formal lectures, internet research and practical demonstrations.

Learning outcome 3 focuses on the underpinning knowledge required for the digital dental environment. It is expected that formal lectures, demonstrations, external speakers and field trips to dental shows etc. will form part of the delivery of this outcome.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 1** | |
| *Understand the selection and use of dental implants* | |
| Introduction to clinical aspects of dental implantology | 1 |
| Discuss diagnostic, clinical stages and techniques, and technologies of implant treatment | 1 |
| Review the use of radiographic and CT MRI scanning techniques | 2 |
| Demonstrate the construction of a ball bearing stent | 1 |
| Present an introduction to impression taking techniques, transfer of information, cross-infection control | 2 |
| Learner practical activity – design and construct an open impression tray; discuss the healing process and the role of the dental team | 2 |
| Examine the ideal requirements for materials used to construct implants | 2 |
| Learners discuss biocompatible materials | 1 |
| Present information on abutment materials and superstructure materials, focusing on properties and compatibility of metals | 2 |
| Consider modern metal free restorations and the use of metal free materials | 1 |
| Discuss the selection of implants for the different dental technology disciplines | 1 |
| Present information to develop knowledge of the application of implants to support fixed prosthodontics | 1 |
| Presentation into the implant techniques used for removable prosthetics | 1 |
| Discuss orthodontic implant techniques and maxillo facial cases | 2 |
| Examine commonly used dental implant systems | 1 |
| Discuss the design of retentive systems used to support implant superstructures | |
| Discuss the technical skills required, staff training, additional equipment to construct dental implant restorations | 1 |
| Learner assignment development and study | |
| **Assignment 1: Clinical and technical procedures related to dental implants and dental attachments** (P1, P2, P3, M1, M2, M3, D1, D2, D3) | 10 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 2** | |
| *Know how to select and use semi precision and precision attachments* | |
| Introduction to clinical stages and professional practice of attachment restorative procedures | 1 |
| Presentation on common preparation designs commonly used in conjunction with attachments | 1 |
| Present an introduction to the mechanical, biological, physical and biomechanical requirements of alloys used in a range of attachment situations | 2 |
| Investigate metal free materials that can be used as part of an attachment treatment plan | 2 |
| Describe the design principles of a comprehensive range of attachments and their applications through evaluation of options available<br>Presentation focusing on the design principles of telescopic abutments and their application | 7 |
| Describe the design principles and application of combination appliances | 2 |
| Demonstrate the principles of CAD/CAM scanning and milling | 2 |
| Outline the principles of articulation | 2 |
| Practical demonstration of a common articulation technique | 1 |
| Using a parallelometer, demonstrate the equipment and analyse casts | 2 |
| Examine the requirements of investments and casting techniques | 2 |
| Practical demonstration of metal milling processes | 1 |
| Presentation illustrating the matrix and patrix stages followed by practical demonstration | 2 |
| Examine finishing procedures | 2 |
| Learner assignment development and study | 1 |
| **Assignment 2: The selection and use of semi-precision and precision attachments** (P4, P5) | 10 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcome 3** | |
| *Understand the principles of modern digital dental systems* | |
| *Applications for manufacture of dental prosthesis and appliances:* 3D modelling; laser, contact and intra-oral scanning; 3D printing for models; milling systems; CAD/CAM imaging systems, including diagnostics; digital shade taking systems; industry software packages | |
| Introduction to the principles of digital systems: CAD and CAM for biomechanically sound systems | 1 |
| Internet research into the advantages and uses of rapid prototyping | 2 |
| Presentation discussing oral digital scanning with demonstrations of current systems (external delivery) | 2 |
| Examine the material requirements required for these techniques | 1 |
| Demonstrate current digital software package that includes a virtual model environment | 2 |
| Present digital manufacturing techniques used to form dental appliances | 2 |
| Introduction to the design and manufacturing processes undertaken to form prosthesiis | 3 |
| Present the benefits for treatment of maxillo facial patients using CAD/CAM and digital imaging | 2 |
| Practical demonstration of shade taking systems | 1 |
| Research a range of laser scanning systems | 2 |
| Demonstration of common CAD/CAM software packages | 1 |
| Discuss contact scanning systems | 1 |
| Present an introduction to milling lathes and milling centres | 1 |
| Examine the use of a range of intra-oral scanning systems<br>Learner assignment development and study | 3 |
| **Assignment 3: The digital dental environment** (P6, M4, D4) | 6 |
| **Total learning time hours** | **102** |

## Assessment

To achieve a **pass** grade, learners must achieve **all six** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all four** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **all four** distinction criteria as outlined in the grading grid.

P1 requires learners to explain the clinical procedures undertaken during the clinical stages of implantology. Learners will be expected to cover the clinical appointments and areas of patient care associated with this treatment. They should include all diagnostic phases of treatment, including the use of digital imaging implant selection, site preparation and impression taking techniques. Evidence could be in the form of a formal report or a patient information booklet on clinical stages of treatment.

P2 requires learners to discuss the forms of available dental implants and their application. They will be expected to cover at least three implant types used for restorative techniques in all dental technology disciplines. Evidence could be in the same form as for P1.

P3 requires learners to explain the technical procedures used in dental laboratories to fabricate implant based restorations. Learners will be expected to produce a logical account of the related procedures for one type of implant restoration. Evidence for this could be the production of standard operating procedures (SOPs) supported by images and diagrams relevant to the process. Alternatively, learners could provide evidence in the form of a presentation using IT.

For P4, learners need to describe the clinical procedures undertaken after dental attachment treatment has been selected. Learners will be expected to include the clinical appointments and areas of patient care associated with this treatment. They should include planning phases of treatment, tooth preparation, attachment selection and impression taking techniques. This criterion could be assessed through learners writing an article for a magazine or producing a patient information booklet on clinical stages of treatment.

For P5, learners must describe the different dental attachment systems used in dental technology. They also need to discuss the use of attachments based on specific case studies. Evidence could be in the same format as for P4 or take the form of a presentation.

For P6, learners need to discuss the use of digital systems that can enhance the production of restorative appliances. They should include clinical and technical systems. Evidence could take the form of a written report, essay or IT presentation with hand-outs.

For M1, learners must discuss the different roles of dental care professionals involved in implant treatments. The significance of each role should be discussed and analysed. Evidence could be provided in the same format as for P1.

M2 requires learners to compare multiple (at least three) dental implant systems against the ideal requirements. They will be expected to carry out research into different implant systems in order to generate a comparison with the generally accepted ideal requirements of implants. Learners should consider clinical and technical factors, including complexity of system, staff training, additional equipment etc. Evidence may be in the same format as for P1.

For M3, learners must explain the technical procedures that are carried out to fabricate appliances that are supported by dental implants. Learners can provide evidence in the form of SOPs.

For M4, learners should consider a range of CAD/CAM systems and provide evidence to justify the selection of a specific system. This could be assessed through a written report.

For D1, learners are expected to analyse the different materials that can be used in the fabrication of an implant supported appliance. They should consider clinical and technical materials. Evidence can be in the same form as for P1.

D2 requires learners to analyse a range of implant systems and to select an implant system based on their findings. Evidence may be in the same format as for P1.

D3 requires learners to critically evaluate common technical procedures used to select an implant system. Evidence can be used from P3 and M3.

For D4, learners should consider a range of digital systems and provide a written evaluation of each, including the advantages of using this type of technology.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, P2, P3, M1, M2, M3, D1, D2, D3 | Clinical and technical procedures related to dental implants and dental attachments | You have been asked by your mentor to develop a patient information leaflet on dental implants to help patients understand the clinical and technical procedures that are required to complete this type of restoration. It is part of a laboratory marketing strategy. It should include visual images of implantology | • Leaflet production using a variety of sources demonstrating knowledge of implant techniques |
| P4, P5 | The selection and use of semi precision and precision attachments | You have been asked to produce a report on dental attachments by a dental technology publishing company, which is sourcing articles for a new private dental technology magazine. You will need to include clinical and technical procedures to help readers select attachments. | • Written report |
| P6, M4, D4 | The digital dental environment | Your employer is developing a website for the laboratory. They have asked you to develop a presentation that can be used on the website to inform potential customers of advances in the dental digital environment. You will need to consider both technical and clinical systems and review the benefits to the dental team and the patient. | • ICT presentation and hand-out |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 7: Removable Complete Prosthodontics |
| Unit 8: Removable Partial Prosthodontics |
| Unit 9: Dental Laboratory Compliance |
| Unit 10: Design of Fixed Prosthodontics |
| Unit 11: Complex Dental Materials Science |
| Unit 12: Techniques for Manufacturing Fixed Prosthodontics |
| Unit 13: Orthodontic Therapy Principles |
| Unit 14: Design, Manufacture and Modification of Orthodontic Appliances |
| Unit 16: Work-based Learning in Dental Technology |

## Essential resources

Facilities required for this unit include a fully-equipped dental laboratory. The laboratory should be fitted with appropriate benching, hand pieces, extractor units, mixing machines, model trimmers, light cure boxes, pressure pots, vacuum forming machines, Bunsen burners and polishing lathes. It should also be equipped with first aid kits, fire extinguishers, PPE, infection control and safety equipment, as well as a wide range of dental materials.

Learners should be equipped with a full dental toolkit and a selection of trimming burs for a variety of materials. Personal protective equipment is mandatory.

Access to hospital and commercial dental laboratories that provide a range of dental technology services is very important.

Staff delivering this unit should be competent and experienced, and be registered dental technicians. Ideally, they should have recent laboratory experience within dental technology and show evidence of regular contact with the industry and/or technical updating.

Learners will need access to library and IT facilities with a range of relevant books, journals and software applications.

## Employer engagement and vocational contexts

To enhance delivery of this unit it is suggested that learners be given the opportunity to access commercial and hospital laboratories as part of a work placement or field trip. Visits to material manufacturers will help learners gain an understanding of the properties of the materials covered in this unit.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE 2] Researching and evaluating the different implant systems |
| Creative thinkers | [CT1] Developing their own independent selection strategy for attachment systems |
| Reflective learners | [RL5] Evaluating their gained knowledge and providing an answer to the selection stages of the grading criteria |
| Effective participators | [EP3] Taking part in group discussions, demonstrations and ICT presentations |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE2,6] Researching the different digital systems that can be used in the fabrication of appliances, scanning and imaging |
| Creative thinkers | [CT2] Taking part in a group discussion or exploring ways to perform a practical task |
| Reflective learners | [RL2] Time managing their personal study towards assignments |
| Team workers | [TW1,6] Constructing practical projects and assisting fellow learners |
| Self-managers | [SM2] Carrying out assignment tasks and time managing their evidence |
| Effective participators | [EP4] Analysing their assignment tasks and taking part in assignment seminars |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Researching the different digital systems that can be used to enhance the production of restorations for the dental team and the patient |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Planning and constructing their assignments in a variety of formats |
| Manage information storage to enable efficient retrieval | Recording their evidence to satisfy assignment briefs and storing the files in a logical, retrievable manner |
| Follow and understand the need for safety and security practices | Ensuring that they use their own logins and passwords and store data in a secure environment |
| Troubleshoot | |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Researching data for assignments using advanced search engine techniques and collating the information |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Using the internet to source information and evaluating the quality of the information provided by recognised websites |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Using digital systems during external presentations and visits to dental shows; providing a variety of information formats in ICT presentations and word processed projects |
| Bring together information to suit content and purpose | Designing their projects and collating the relevant information to meet assignment brief |
| Present information in ways that are fit for purpose and audience | Delivering presentation on the dental digital environment using entertaining and specific material relevant to the audience |

| Skill | When learners are… |
|---|---|
| Evaluate the selection and use of ICT tools and facilities used to present information | Evaluating their ICT presentation, highlighting their strengths and weaknesses and reflecting on how they performed and any improvements they can make |
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Discussing assignment development using email or college recognised chat rooms |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | Calculating distortion factors of x-rays used in the diagnostic stages of implantology |
| Identify the situation or problem and the mathematical methods needed to tackle it | Using implant diagnostic techniques to determine the quantity of available bone around an implant site |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Taking part in group discussion and delivering their ICT presentation |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Sourcing information for assignments and determining which information is relevant to their projects |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Producing an article for a dental technology magazine |

# Unit 16: Work-based Learning in Dental Technology

**Unit reference number:** A/505/9597

**Level:** 3

**Credit value:** 10

**Guided learning hours:** 20

## Unit Aim

The aim of this unit is to enable learners to develop their skills in a real life situation and to gain credit for their work-based activities. It develops a link between the knowledge and skills developed in the programme to enable them to undertake a work-based project and present it in the form of a workbook and a presentation.

## Unit introduction

This unit is intended for both part-time and full-time learners. It is designed to allow flexibility of study, to enable the employed learner to contribute to the development of transferable skills and to be used by the full-time learner during work experience placement in a private or hospital dental laboratory.

Learners should carry out the project in a dental laboratory setting.

Learners need to select a specialist area of their profession to use as a basis for a work-based practical project. Learners should keep a logbook during the construction stages of the appliance to enable feedback on performance and for self-reflection. When learners have finished their custom-made dental appliance, they need to produce a report and presentation based on their project. At all times, the learners should be aware of their responsibilities as potential GDC registrants, ensuring 'Standards' are applied.

It is important that learners have a suitably qualified and registered workplace mentor to work with the academic co-ordinator in the planning, monitoring and collection of evidence for the unit.

## Learning outcomes

**On completion of this unit a learner should:**

1. Be able to plan a work-based dental technology practical project
2. Be able to maintain a logbook for the duration of a work-based dental technology practical project
3. Be able to undertake a work-based dental technology practical project
4. Be able to report on a dental technology practical project

## Unit content

**1 Be able to plan a work-based dental technology practical project**

*Topic:* negotiate a suitable topic and gain approval from tutor and work-based mentor for personal development

*Project planning:* aims; objectives; time management; resources; materials; equipment; communicate effectively with other dental team members; awareness of own competence; taking personal responsibility for development, comply with the relevant GDC standards

*Information:* research equipment required; materials; suppliers; costings; appliance literature research (journals, texts, internet); professional networks

**2 Be able to maintain a logbook for the duration of a work-based dental technology practical project**

*Timing:* adherence to timeline; adjustment as necessary; discussion with mentor

*Logbook entries:* copy of laboratory script; stages of construction (standard operating procedures; images of completed production stages); quality assurance records; mentor feedback; personal conduct; evidence-based self-reflection of professional practice for improvement

**3 Be able to undertake a work-based dental technology practical project**

*Resources:* suitability of workplace (equipment, tools, materials, health and safety); suitability of supervision

*Timing:* agreed laboratory use; release from employment; expenses; timeline for completion of practical; time management

*Vocationally-applied techniques:* reviewing and evaluating prescription; determining and meeting prescription requirements; contacting client and discussing problems with them (impression, design, when to refer, timeline); principles of appliance design; selecting components; modifying components; techniques for constructing components; checking appliance before proceeding to next stage; evaluating finished appliance (fit for purpose, prescription requirements); recording appliance details and storing as required by legislation; statement of manufacture; confirmation of patient consent to be treated by a student technician; working with managers; handling of complaints, ensuring patient information is protected and acting with integrity and honesty when dealing with patients

*Health, safety and professional practice:* clinical governance, accountability and responsibility, legal, ethical and regulatory requirements; promoting health and safety systems and processes, including recognising medical emergencies; PPE; decontamination and infection control; assessing risks; safe use of materials; safe storage and recording of materials; safe use and recording maintenance of equipment; notice of conformity; teamwork, respect and professional attitude; maintaining and protecting information and records; communication and promotion of oral health, awareness of the principles for raising concerns

**4 Be able to report on a dental technology practical project**

*Retrieved information:* assessing relevance of retrieved information; summarising information; using information to support the project

*Practical analysis:* analysing the practical component; assessing accuracy; quality assurance of practical component

*Preparation of a formal report:* introduction; aims; objectives; methods and techniques; material information; researched information; analysis and comparison with alternatives; evaluation of fitness for purpose of outcome and techniques; conclusion; referenced bibliography

*Presentation:* recognised format (oral, textual, photographic, flip chart, computer generated, presentation software, e.g. PowerPoint or Prezi).

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

| Assessment and grading criteria | | |
|---|---|---|
| **To achieve a pass grade the evidence must show that the learner is able to:** | **To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:** | **To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:** |
| P1 produce a plan for a work-based practical project, to include a written and practical element [IE2] | M1 review the effectiveness of the plan against the outcomes of the written and practical project | |
| P2 produce a logbook record to collect evidence at the different stages of a work-based practical project [CT1] | M2 produce a timeline for the practical component of the project | D1 produce standard operating procedures for each construction stage of the practical component of the project |
| P3 construct the practical component, from a given prescription, to a fit-for-purpose standard and complying with health and safety protocols [SM3,5, RL4] | M3 review the finished practical component against the given prescription | D2 critically evaluate the effectiveness of the construction process against the given prescription and health and safety protocols |
| P4 compile a report on a work-based dental technology practical project | | |
| P5 create a presentation of the project that could be presented to an audience | M4 present the report to an audience using a recognised format | |

**PLTS**: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

| | |
|---|---|
| **Key** | IE – independent enquirers<br>CT – creative thinkers<br>RL – reflective learners<br>TW – team workers<br>SM – self-managers<br>EP – effective participators |

# Essential guidance for tutors

## Delivery and assessment guidance

Learners need access to a fully-equipped dental laboratory that provides a service for all specialist areas of dental technology. Learners also need contact with a dental team to complete their project.

## Delivery

This unit involves independent learning but learners attempting pass and merit level may require tutor support and guidance throughout the assignment. The underpinning knowledge for this unit would have been provided throughout the learning period and covered in relevant previous units. Learners and work-based mentors should be briefed on the nature of the unit and of the evidence required to achieve the outcomes.

For learning outcome 1, planning of the assignment topic is expected to be delivered through personal study and personal tutorials with the tutor and the work-based mentor. The work for this unit may be part of a learner's normal workload or some activity specially designed to deliver the required evidence. In either case, the planning should be complete before starting the practical component.

For learning outcome 2, learners need to complete the work-based logbook, but it is expected that the tutor and work-based mentor will review the logbook periodically to sign off after each stage of construction and to provide feedback with an opportunity for learner self-reflection.

For learning outcome 3, learners should construct the practical component alone. However, learners will collaborate and practice within guidelines, and show accountability during the work-based learning. Health and safety, and quality standards must be adhered to throughout this learning outcome.

For learning outcome 4, the written report completed by learners, and based on the investigation of the practical component, should be delivered through personal study and tutorials. Learners should also create a presentation based on the written report that could be delivered to an audience. The presentation can be in any recognised format.

## Outline learning plan

The *Outline learning plan* has been included in this unit as guidance and can be used in conjunction with the *Programme of suggested assignments*.

The *Outline learning plan* demonstrates one way in planning the delivery and assessment of this unit.

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcomes 1 and 2 (delivered/assessed together)** | |
| *Be able to plan a work-based dental technology practical project* | |
| *Be able to maintain a logbook for the duration of a work-based dental technology practical project* | |
| Introduction to the unit and discuss specialist areas | 3 |
| Select and research a specialist area of dental technology | 3 |
| Arrange visits to dental laboratories to establish networks | 4 |
| Discuss with tutor your specialist area and identified laboratory | 2 |
| Discussion of specialist area with work-based mentor | 2 |
| Research theory regarding planning and producing a project | 6 |
| Identify aims and objectives for the project | 1 |
| Identify necessary materials, equipment and techniques<br>Review the effectiveness of the planning<br>Plan the layout of logbook and discuss with tutor for approval | 2<br>2<br>2 |
| Discuss the use of the logbook with tutor and mentor | 3 |
| Produce a timeline for the practical project | 2 |
| Produce images of each stage, copies to be included in report | 1 |
| Keep logbook and ensure evidence is validated by mentor and tutor | 5 |
| Personal study and research time | 4 |
| **Assignment 1: A plan and logbook for a work-based project** (P1, P2, M1, M2, D1) | 6 |

| Topic and suggested assignments/activities/assessment | Hours |
|---|---|
| **Learning outcomes 3 and 4 (delivered/assessed together)** | |
| *Be able to undertake a work-based dental technology practical project* | |
| *Be able to report on a dental technology practical project* | |
| Assess identified workplace regarding supervision, equipment and materials to complete practical component | 2 |
| Pre-plan practical tasks | 2 |
| Identify standard operating procedures for each stage | 2 |
| Identify health and safety precautions, protocols for collaboration and accountability, and legal and regulatory requirements | 2 |
| Record each stage of the practical process for the chosen appliance | 2 |
| Analyse each completed stage, using quality evaluation and an evidence-based approach | 2 |
| Document any problems encountered at each stage | 2 |
| Discuss completed stages with mentor | 2 |
| Collate relevant documents that relate to selected topic | 2 |
| Personal study and research time | 4 |
| **Assignment 2: Construction and review of the appliance** (P3, M3, D2) | 18 |
| Review and evaluation of constructed appliance and process, with alternative solutions | 2 |
| Identify methods of presentation for a report, types of software, images, flip chart, slide projector, digital projector and hand-outs | 1 |
| Create a presentation of the report | 3 |
| **Assignment 3: Project report and presentation** (P4, P5, M4) | 6 |
| **Total learning time hours** | **100** |

## Assessment

To achieve a **pass** grade, learners must achieve **all five** pass criteria as outlined in the grading grid. To achieve a **merit** grade, learners must achieve all of the **pass** criteria plus **all four** merit criteria as outlined in the grading grid. To achieve a **distinction grade**, learners must achieve all **pass** and **merit** criteria plus **both** distinction criteria as outlined in the grading grid.

For P1, learners must produce a plan for a work-based dental technology practical project. This includes identifying a topic and investigating information relevant to the identified practical component from sources or networks.

For P2, learners must create and maintain a work-based logbook. It should record evidence of the stages of construction and offer an opportunity for mentor and evidence-based self-reflection on professional practice.

For P3, learners must construct the practical component of the project as identified in their plan. Learners must ensure the appliance is fit for purpose and complies with relevant health and safety legislation and quality assurance control procedures. Evidence could be through observation records.

For P4, learners must compile a report on a work-based dental technology practical project. It should include aims, objectives, timeline, costings, laboratory script, images, standard operating procedures, mentor feedback and personal reflection.

For P5, learners must create a presentation in a recognised format that could be used to present their practical project to an audience. This could be in an oral, textual, photographic, flip chart or computer-generated format.

For M1, learners must review the effectiveness of the plan against the outcomes of the written and practical project, identifying strengths, areas for improvements and alterations that they would make in future plans.

For M2, learners must provide a realistic timeline for the completion of the written and practical component. They must also produce costings for each practical stage of the project.

For M3, learners must review the finished appliance against the given prescription to ensure compliance, and assess the completed appliance against recognised industry standard quality assurance criteria. They must also produce a notice of conformity to be supplied to the dentist and patient.

For M4, learners must present their project to an audience using an acceptable format. Evidence could be through a completed observation record of the presentation, self-evaluation or peer feedback.

For D1, learners must create standard operating procedures for each stage of the practical component of the project. The standard operating procedures must be in a format that could be used as part of a laboratory's quality control system.

For D2, learners must critically evaluate the effectiveness of the construction process against the given prescription and health and safety protocols. They should evaluate each of the practical stages and comment on any health and safety concerns.

## Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

| Criteria covered | Assignment title | Scenario | Assessment method |
|---|---|---|---|
| P1, P2, M1, M2, D1 | A plan and logbook for a work-based project | You are working in a laboratory where you have the opportunity to select an appliance from one of the specialist dental areas and use it as a base for a project. To enable you to complete the project, you are required to produce a plan and a logbook. You will need to review the plan. | • Assignment |
| P3, M3, D2 | Construction and review of the appliance | You must construct your appliance in a laboratory equipped to produce the appliance chosen for your project. You will need to review and evaluate the construction of the appliance and the processes that you followed. | • Observation records<br>• Written review and evaluation |
| P4, P5, M4 | Project report and presentation | You will complete your project and then produce a presentation and present it to an audience. | • Completed report<br>• Completed presentation<br>• Observation record |

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Dental Technology sector suite. This unit has particular links with the following unit titles in the Dental Technology suite:

| Level 3 |
|---|
| Unit 1: Dental Technology Fundamentals |
| Unit 2: Medical Emergencies, First Aid and Communication in the Dental Team |
| Unit 3: Dental Anatomy, Physiology and Disease |
| Unit 4: Basic Dental Materials Science |
| Unit 5: Legislation, Professionalism and Ethics in Dentistry |
| Unit 6: Dental Public Health and Preventative Dentistry |
| Unit 7: Removable Complete Prosthodontics |
| Unit 8: Removable Partial Prosthodontics |
| Unit 9: Dental Laboratory Compliance |
| Unit 10: Design of Fixed Prosthodontics |
| Unit 11: Complex Dental Materials Science |
| Unit 12: Techniques for Manufacturing Fixed Prosthodontics |
| Unit 13: Orthodontic Therapy Principles |
| Unit 14: Design, Manufacture and Modification of Orthodontic Appliances |
| Unit 15: Advanced Dental Technology Techniques and Procedures |

## Essential resources

Facilities required for this unit include a fully-equipped dental laboratory with PPE, infection control and safety equipment and a wide range of dental materials. Learners should be equipped with a full dental toolkit and a selection of trimming burs for a variety of materials.

It is important that learners have access to hospital and commercial dental laboratories that provide a range of dental technology services.

Staff delivering this unit should be competent, experienced and registered dental technicians. They should have laboratory experience within dental technology and show evidence of regular contact with the industry and/or technical updating (CPD). The work-based mentor should be agreed with the learner and tutor prior to commencement of the construction of the practical component.

Learners will need access to library and ICT facilities with a range of relevant books, journals and software applications.

## Employer engagement and vocational contexts

It is important that links are established between centres and local private and hospital dental laboratories. Learners will need access to a fully-equipped laboratory and General Dental Council registered dental technical staff from their selected specialist dental area.

## Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

| Skill | When learners are… |
|---|---|
| Independent enquirers | [IE2] Planning and carrying out research to identify and decide on a suitable practical assignment and being aware of the consequences if they are unable to complete the appliance |
| Creative thinkers | [CT1] Generating ideas regarding how the logbook should be set out and completed |
| Reflective learners | [RL4] Inviting feedback from more experienced technical staff regarding each stage of construction of the appliance |
| Team workers | [TW1] Working with others during the construction of the practical component |
| Self-managers | [SM2; SM5] Organising their time and resources to complete each process of the practical, dealing with other practical work separate from their project |

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

| Skill | When learners are… |
|---|---|
| Self-managers | [SM3] Handing in report<br>Ensuring practical stages of appliance are on time for patient appointments |

## Functional Skills – Level 2

| Skill | When learners are… |
|---|---|
| **ICT – Use ICT systems** | |
| Select, interact with and use ICT systems independently for a complex task to meet a variety of needs | Using the in-house ICT system to find information relating to the specialist area they have selected; designing a work logbook |
| Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used | Compiling information, images and transferring into allocated files; reflecting on the finished work and the way it was compiled |
| Manage information storage to enable efficient retrieval | Saving information and assignment work in a folder |
| Follow and understand the need for safety and security practices | Aware of keeping their password safe and not disclosing it to others |
| Troubleshoot | Identifying and reporting a fault |
| **ICT – Find and select information** | |
| Select and use a variety of sources of information independently for a complex task | Collecting information from books, journals, the internet and hand-outs supplied by the tutor |
| Access, search for, select and use ICT-based information and evaluate its fitness for purpose | Obtaining information from identified websites and assessing whether it suits the purpose of the task |
| **ICT – Develop, present and communicate information** | |
| Enter, develop and format information independently to suit its meaning and purpose including:<br>• text and tables<br>• images<br>• numbers<br>• records | Making sure that the information they require is obtainable from a website, e.g. images of dental appliances and equipment; taking digital photographs of the different stages of the report and uploading into the appropriate file; compiling a table of materials used and their costings; organising a timetable for the different stages of construction and patient appointments |
| Bring together information to suit content and purpose | Creating a single document that has all the information for their report |
| Present information in ways that are fit for purpose and audience | Presenting the information in the way it was requested in the brief, e.g. a report and an oral presentation |
| Evaluate the selection and use of ICT tools and facilities used to present information | Discussing how the document can be improved |

| Skill | When learners are… |
|---|---|
| Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists | Using email to send centre-produced work to own address; keeping own messages and replies safely in a folder; creating a contact list of suppliers regarding materials and equipment |
| **Mathematics** | |
| Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations | Calculating costings for the practical task |
| Identify the situation or problem and the mathematical methods needed to tackle it | |
| Select and apply a range of skills to find solutions | |
| Use appropriate checking procedures and evaluate their effectiveness at each stage | |
| Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations | |
| Draw conclusions and provide mathematical justifications | |
| **English** | |
| Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts | Discussing construction techniques for the practical tasks; presenting their report to the class |
| Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions | Reading hand-outs given during lectures |
| Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively | Writing their report; creating a hand-out for their presentation; presenting their report to an audience |

# Training and support from Pearson

## People to talk to

There are many people who can support you and give you advice and guidance on delivering your BTEC Level 3 qualifications. They include:

- Standards Verifiers – they can support you with preparing your assignments, ensuring that your assessment plan is set up correctly, and support you in preparing learner work and providing quality assurance through sampling
- Subject Advisors – they understand all Pearson qualifications in their sector and so can answer sector-specific queries on planning, teaching, learning and assessment
- Customer Services – the 'Support for You' section of our website gives the different ways in which you can contact us for general queries. For specific queries, our service operators can direct you to the relevant person or department.

## Professional development and training

We provide a range of training and professional development events to support the delivery, assessment and administration of BTEC Level 3 qualifications. These sector-specific events, developed and delivered by specialists, are available both face to face and online.

# Annexe A

## Grading domains: BTEC Level 3 generic grading domains

| Grading domain 1 | Indicative characteristics — merit | Indicative characteristics — distinction |
|---|---|---|
| **Application of knowledge and understanding**<br><br>(Learning outcome stem *understand* or *know*) | • Shows depth of knowledge and development of understanding in familiar and unfamiliar situations (for example explain why, makes judgements based on analysis).<br>• Applies and/or selects concepts showing comprehension of often complex theories.<br>• Applies knowledge in often familiar and unfamiliar contexts.<br>• Applies knowledge to non-routine contexts (e.g. assessor selection).<br>• Makes reasoned analytical judgements.<br>• Shows relationships between pass criteria. | • Synthesises knowledge and understanding across pass/merit criteria.<br>• Evaluates complex concepts/ ideas/actions and makes reasoned and confident judgements.<br>• Uses analysis, research and evaluation to make recommendations and influence proposals.<br>• Analyses implications of application of knowledge/understanding.<br>• Accesses and evaluates knowledge and understanding to advance complex activities/contexts.<br>• Shows relationships with pass/merit criteria.<br>• Responds positively to evaluation. |

| Grading domain 2 | Indicative characteristics — merit | Indicative characteristics — distinction |
|---|---|---|
| **Development of practical and technical skills**<br><br>(Learning outcome stem *be able to*) | • Deploys appropriate advanced techniques/processes/skills.<br>• Applies technical skill to advance non-routine activities.<br>• Advances practical activities within resource constraints.<br>• Produces varied solutions (including non-routine).<br>• Modifies techniques/processes to situations.<br>• Shows relationship between pass criteria. | • Demonstrates creativity/ originality/own ideas.<br>• Applies skill(s) to achieve higher order outcome.<br>• Selects and uses successfully from a range of advanced techniques/processes/skills.<br>• Reflects on skill acquisition and application.<br>• Justifies application of skills/methods.<br>• Makes judgements about risks and limitations of techniques/ processes.<br>• Innovates or generates new techniques/processes for new situations.<br>• Shows relationship with pass and merit criteria. |

| Grading domain 3 | Indicative characteristics — merit | Indicative characteristics — distinction |
|---|---|---|
| **Personal development for occupational roles**<br><br>(Any learning outcome stem) | • Takes responsibility in planning and undertaking activities.<br>• Reviews own development needs.<br>• Finds and uses relevant information sources.<br>• Acts within a given work-related context showing understanding of responsibilities.<br>• Identifies responsibilities of employers to the community and the environment.<br>• Applies qualities related to the vocational sector.<br>• Internalises skills/attributes (creating confidence). | • Manages self to achieve outcomes successfully.<br>• Plans for own learning and development through the activities.<br>• Analyses and manipulates information to draw conclusions.<br>• Applies initiative appropriately.<br>• Assesses how different work-related contexts or constraints would change performance.<br>• Reacts positively to changing work-related contexts<br>• Operates ethically in work-related environments.<br>• Takes decisions related to work contexts.<br>• Applies divergent and lateral thinking in work-related contexts.<br>• Understands interdependence. |

| Grading domain 4 | Indicative characteristics — merit | Indicative characteristics — distinction |
|---|---|---|
| **Application of generic skills**<br><br>(Any learning outcome stem) | • Communicates effectively using appropriate behavioural and language registers.<br>• Communicates with clarity and influence.<br>• Makes judgements in contexts with explanations.<br>• Explains how to contribute within a team.<br>• Demonstrates positive contribution to team(s).<br>• Makes adjustments to meet the needs/expectations of others (negotiation skills).<br>• Selects and justifies solutions for specified problems. | • Presents self and communicates information to meet the needs of a variety of audience.<br>• Identifies strategies for communication.<br>• Shows innovative approaches to dealing with individuals and groups.<br>• Takes decisions in contexts with justifications.<br>• Produces outputs subject to time/resource constraints.<br>• Reflects on own contribution to working within a team.<br>• Generates new or alternative solutions to specified problems.<br>• Explores entrepreneurial attributes. |

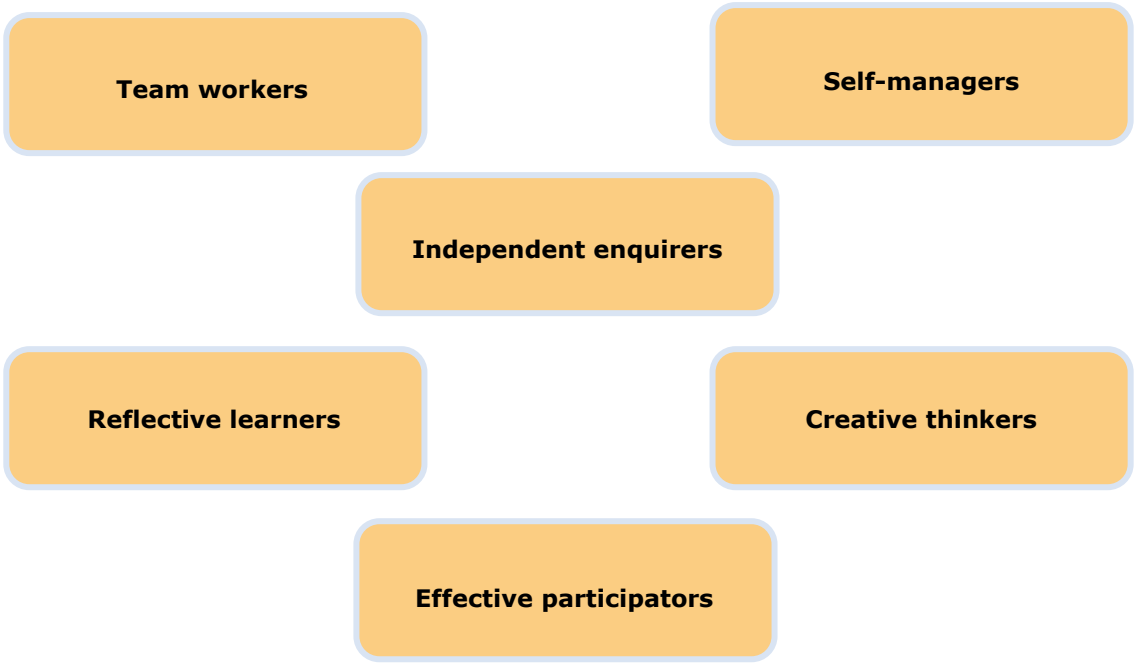
# Annexe B

## Personal, learning and thinking skills

### A FRAMEWORK OF PERSONAL, LEARNING AND THINKING SKILLS 11–19 IN ENGLAND

The framework comprises six groups of skills that, together with the Functional Skills of English, mathematics and ICT, are essential to success in learning, life and work. In essence, the framework captures the essential skills of: managing self; managing relationships with others; and managing own learning, performance and work. It is these skills that will enable young people to enter work and adult life confident and capable.

The titles of the six groups of skills are set out below.




For each group there is a focus statement that sums up the range of skills. This is followed by a set of outcome statements that are indicative of the skills, behaviours and personal qualities associated with each group.

Each group is distinctive and coherent. The groups are also inter-connected. Young people are likely to encounter skills from several groups in any one learning experience. For example, an independent enquirer would set goals for their research with clear success criteria (reflective learner) and organise and manage their time and resources effectively to achieve these (self-manager). In order to acquire and develop fundamental concepts such as organising oneself, managing change, taking responsibility and perseverance, learners will need to apply skills from all six groups in a wide range of learning contexts 11-19.

## The Skills

### Independent enquirers

Focus:

Young people process and evaluate information in their investigations, planning what to do and how to go about it. They take informed and well-reasoned decisions, recognising that others have different beliefs and attitudes.

Young people:

- identify questions to answer and problems to resolve
- plan and carry out research, appreciating the consequences of decisions
- explore issues, events or problems from different perspectives
- analyse and evaluate information, judging its relevance and value
- consider the influence of circumstances, beliefs and feelings on decisions and events
- support conclusions, using reasoned arguments and evidence.

### Creative thinkers

Focus:

Young people think creatively by generating and exploring ideas, making original connections. They try different ways to tackle a problem, working with others to find imaginative solutions and outcomes that are of value.

Young people:

- generate ideas and explore possibilities
- ask questions to extend their thinking
- connect their own and others' ideas and experiences in inventive ways
- question their own and others' assumptions
- try out alternatives or new solutions and follow ideas through
- adapt ideas as circumstances change.

### Reflective learners

Focus:

Young people evaluate their strengths and limitations, setting themselves realistic goals with criteria for success. They monitor their own performance and progress, inviting feedback from others and making changes to further their learning.

Young people:

- assess themselves and others, identifying opportunities and achievements
- set goals with success criteria for their development and work
- review progress, acting on the outcomes
- invite feedback and deal positively with praise, setbacks and criticism
- evaluate experiences and learning to inform future progress
- communicate their learning in relevant ways for different audiences.

**Team workers**

Focus:

Young people work confidently with others, adapting to different contexts and taking responsibility for their own part. They listen to and take account of different views. They form collaborative relationships, resolving issues to reach agreed outcomes.

Young people:

- collaborate with others to work towards common goals
- reach agreements, managing discussions to achieve results
- adapt behaviour to suit different roles and situations, including leadership roles
- show fairness and consideration to others
- take responsibility, showing confidence in themselves and their contribution
- provide constructive support and feedback to others.

**Self-managers**

Focus:

Young people organise themselves, showing personal responsibility, initiative, creativity and enterprise with a commitment to learning and self-improvement. They actively embrace change, responding positively to new priorities, coping with challenges and looking for opportunities.

Young people:

- seek out challenges or new responsibilities and show flexibility when priorities change
- work towards goals, showing initiative, commitment and perseverance
- organise time and resources, prioritising actions
- anticipate, take and manage risks
- deal with competing pressures, including personal and work-related demands
- respond positively to change, seeking advice and support when needed
- manage their emotions, and build and maintain relationships.

**Effective participators**

Focus:

Young people actively engage with issues that affect them and those around them. They play a full part in the life of their school, college, workplace or wider community by taking responsible action to bring improvements for others as well as themselves.

Young people:

- discuss issues of concern, seeking resolution where needed
- present a persuasive case for action
- propose practical ways forward, breaking these down into manageable steps
- identify improvements that would benefit others as well as themselves
- try to influence others, negotiating and balancing diverse views to reach workable solutions
- act as an advocate for views and beliefs that may differ from their own.

## PLTS performance indicator (suggested recording sheet)

| **Name:** | **Date:** | | | | |
|---|---|---|---|---|---|
| | **Level of success**<br>1 = low, 5 = high | | | | |
| **Independent enquirers** | | | | | |
| Identify questions to answer and problems to resolve | 1 | 2 | 3 | 4 | 5 |
| Plan and carry out research, appreciating the consequences of decisions | 1 | 2 | 3 | 4 | 5 |
| Explore issues, events or problems from different perspectives | 1 | 2 | 3 | 4 | 5 |
| Analyse and evaluate information, judging its relevance and value | 1 | 2 | 3 | 4 | 5 |
| Consider the influence of circumstances, beliefs and feelings on decisions and events | 1 | 2 | 3 | 4 | 5 |
| Support conclusions, using reasoned arguments and evidence | 1 | 2 | 3 | 4 | 5 |
| **Creative thinkers** | | | | | |
| Generate ideas and explore possibilities | 1 | 2 | 3 | 4 | 5 |
| Ask questions to extend their thinking | 1 | 2 | 3 | 4 | 5 |
| Connect their own and others' ideas and experiences in inventive ways | 1 | 2 | 3 | 4 | 5 |
| Question their own and others' assumptions | 1 | 2 | 3 | 4 | 5 |
| Try out alternatives or new solutions and follow ideas through | 1 | 2 | 3 | 4 | 5 |
| Adapt ideas as circumstances change | 1 | 2 | 3 | 4 | 5 |
| **Reflective learners** | | | | | |
| Assess themselves and others, identifying opportunities and achievements | 1 | 2 | 3 | 4 | 5 |
| Set goals with success criteria for their development and work | 1 | 2 | 3 | 4 | 5 |
| Review progress, acting on the outcomes | 1 | 2 | 3 | 4 | 5 |
| Invite feedback and deal positively with praise, setbacks and criticism | 1 | 2 | 3 | 4 | 5 |
| Evaluate experiences and learning to inform future progress | 1 | 2 | 3 | 4 | 5 |
| Communicate their learning in relevant ways for different audiences | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| **Team workers** | | | | | |
| Collaborate with others to work towards common goals | 1 | 2 | 3 | 4 | 5 |
| Reach agreements, managing discussions to achieve results | 1 | 2 | 3 | 4 | 5 |
| Adapt behaviour to suit different roles and situations, including leadership roles | 1 | 2 | 3 | 4 | 5 |
| Show fairness and consideration to others | 1 | 2 | 3 | 4 | 5 |
| Take responsibility, showing confidence in themselves and their contribution | 1 | 2 | 3 | 4 | 5 |
| Provide constructive support and feedback to others | 1 | 2 | 3 | 4 | 5 |
| **Self-managers** | | | | | |
| Seek out challenges or new responsibilities and show flexibility when priorities change | 1 | 2 | 3 | 4 | 5 |
| Work towards goals, showing initiative, commitment and perseverance | 1 | 2 | 3 | 4 | 5 |
| Organise time and resources, prioritising actions | 1 | 2 | 3 | 4 | 5 |
| Anticipate, take and manage risks | 1 | 2 | 3 | 4 | 5 |
| Deal with competing pressures, including personal and work-related demands | 1 | 2 | 3 | 4 | 5 |
| Respond positively to change, seeking advice and support when needed | 1 | 2 | 3 | 4 | 5 |
| Manage their emotions, and build and maintain relationships | 1 | 2 | 3 | 4 | 5 |
| **Effective participators** | | | | | |
| Discuss issues of concern, seeking resolution where needed | 1 | 2 | 3 | 4 | 5 |
| Present a persuasive case for action | 1 | 2 | 3 | 4 | 5 |
| Propose practical ways forward, breaking these down into manageable steps | 1 | 2 | 3 | 4 | 5 |
| Identify improvements that would benefit others as well as themselves | 1 | 2 | 3 | 4 | 5 |
| Try to influence others, negotiating and balancing diverse views to reach workable solutions | 1 | 2 | 3 | 4 | 5 |
| Act as an advocate for views and beliefs that may differ from their own | 1 | 2 | 3 | 4 | 5 |

**Note to learner:** The circled number represents an indication of your PLTS performance so far.

**Note to tutor**: Indicate the level of success by circling the appropriate number during your feedback with the learner.

## Summary of the PLTS coverage throughout the programme

This table shows where units support the development of personal, learning and thinking skills.

**Key**

✓ indicates opportunities for development

a blank space indicates no opportunities for development

| Unit | Personal, learning and thinking skills | | | | | |
|---|---|---|---|---|---|---|
| | Independent enquirers | Creative thinkers | Reflective learners | Team workers | Self-managers | Effective participators |
| 1 | | ✓ | ✓ | | ✓ | ✓ |
| 2 | ✓ | ✓ | ✓ | ✓ | | ✓ |
| 3 | ✓ | ✓ | ✓ | | | |
| 4 | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6 | ✓ | ✓ | | | ✓ | |
| 7 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 8 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 9 | ✓ | ✓ | ✓ | | | ✓ |
| 10 | ✓ | | | | ✓ | |
| 11 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 12 | ✓ | ✓ | | | ✓ | |
| 13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 14 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 15 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 16 | ✓ | ✓ | ✓ | ✓ | ✓ | |

# Annexe C

## Wider curriculum mapping

The qualifications in this specification give learners opportunities to develop an understanding of spiritual, moral, ethical, social and cultural issues, as well as an awareness of citizenship, environmental issues, European developments, health and safety considerations and equal opportunities issues.

The BTEC qualifications in this specification make a positive contribution to wider curricular areas as appropriate.

### Spiritual, moral, ethical, social and cultural issues

These qualifications contribute to an understanding of:

- **spiritual issues** – for example when exploring the positive and negative impacts of dental technology learners could consider increased understanding of different religious and ethnic groups, or when investigating service provision of community dental services learners could research the needs of different spiritual groups
- **social and cultural issues** – for example the socio-cultural impacts of dental technology procedures, or differing needs of different socio-cultural patient groups

### Citizenship issues

Citizenship issues are implicit throughout the BTEC qualifications in this specification.

### Environmental issues

Learners undertaking the BTEC qualifications in this specification will have the opportunity to develop their understanding of environmental issues, for example by exploring potential environmental impacts of dental technology and how positive impacts may be enhanced or negative impacts minimised.

### European developments

Much of the content of the BTEC qualifications in this specification applies throughout Europe even though delivery is in a UK context.

### Health and safety considerations

The BTEC qualifications in this specification are practically based and health and safety issues are encountered throughout the units.

### Equal opportunities issues

Equal opportunities issues are implicit throughout the BTEC qualifications in this specification.

## Wider curriculum mapping

### Level 3

| | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Spiritual | | ✓ | | | ✓ | ✓ | | | ✓ | | | | | | | ✓ |
| Moral and ethical | ✓ | ✓ | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| Social and cultural | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ |
| Citizenship issues | | ✓ | | | ✓ | ✓ | | | ✓ | | ✓ | | | | | ✓ |
| Environmental issues | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| European developments | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | ✓ |
| Health and safety considerations | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Equal opportunities issues | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

# Annexe D

## Unit mapping overview

BTEC National in Dental Technology (specification end date 31/12/2013)/new versions of the BTEC qualifications in Dental Technology (specification start date 01/09/2014) – the BTEC Level 3 Diploma in Dental Technology (QCF) and the BTEC Level 3 Extended Diploma in Dental Technology (QCF).

| Old units / New units | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 11 | Unit 13 | Unit 14 | Unit 15 | Unit 16 | Unit 17 | Unit 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Unit 1** | F | | F | | | | | | | | | | | | | | | | |
| **Unit 2** | | F | | | | | | | | | | | | | | | | | |
| **Unit 3** | | | | X | | | | | | | | | | | | | | | |
| **Unit 4** | | | | | P | | | | | | | | | | | | | | |
| **Unit 5** | | | | | | F | | | | | | | | | | | | | |
| **Unit 6** | | | | | | | F | | | | | | | | | | | | |
| **Unit 7** | | | | | | | | F | | | | | | | | | | | |
| **Unit 8** | | | | | | | | | F | | | | | | | | | | |
| **Unit 9** | | | | | | | | | | | | | | | P | | | | |
| **Unit 10** | | | | | | | | | | | F | | | | | | | | |
| **Unit 11** | | | | | | | | | | | | P | | | | | | | |

| New units \ Old units | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 11 | Unit 13 | Unit 14 | Unit 15 | Unit 16 | Unit 17 | Unit 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Unit 12** | | | | | | | | | | | | | | F | | | | | |
| **Unit 13** | | | | | | | | | | | | | | | | F | | | |
| **Unit 14** | | | | | | | | | | | | | | | | | F | | |
| **Unit 15** | | | | | | | | | | | | | | | | | | F | |
| **Unit 16** | | | | | | | | | | | | | | | | | | | F |

**KEY**

P – Partial mapping (some topics from the old unit appear in the new unit)

F – Full mapping (topics in old unit match new unit exactly or almost exactly)

X – Full mapping + new (all the topics from the old unit appear in the new unit, but new unit also contains new topic(s))

## Unit mapping in depth

BTEC National in Dental Technology (specification end date 31/12/2013)/new versions of the BTEC qualifications in Dental Technology (specification start date 01/09/2014) – the BTEC Level 3 Diploma in Dental Technology (QCF) and the BTEC Level 3 Extended Diploma in Dental Technology (QCF).

| New units | | Old units | | Mapping/comments (new topics in italics) |
|---|---|---|---|---|
| **Number** | **Name** | **Number** | **Name** | |
| **Unit 1** | Dental Technology Fundamentals | **1** | Fundamentals of Dental Technology | Learning outcomes 1-4 of the old units are covered |
| | | **3** | Dental Technology Techniques | Learning outcomes 1-4 of the old units are covered |
| **Unit 2** | Medical Emergencies, First Aid and Communication in the Dental Team | **2** | Medical Emergencies, First Aid and Communication in the Dental Team | Learning outcomes 1-4 of the old units are covered |
| **Unit 3** | Dental Anatomy, Physiology and Disease | **4** | Dental Anatomy, Oral Biology and Disease | Learning outcomes 1-4 of the old units are covered<br>'Learning outcome 5: Understand the physiology of cells, tissues and human regulatory processes' has been added |
| **Unit 4** | Basic Dental Materials Science | **5** | Basic Dental Biomaterials Science | Learning outcomes 1-4 of the old units are covered<br>In learning outcome 1 the aspect mathematical calculations used in dental technology have been added<br>In learning outcome 2 fundamental scientific principles essential to dental technology have been added |
| **Unit 5** | Legislation, Professionalism and Ethics in Dentistry | **6** | Legislation, Professionalism and Ethics in Dentistry | Learning outcomes 1-4 of the old units are covered |
| **Unit 6** | Dental Public Health and Preventative Dentistry | **7** | Dental Public Health and Preventative Dentistry | Learning outcomes 1-4 of the old units are covered |
| **Unit 7** | Removable Complete Prosthodontics | **8** | Removable Complete Prosthodontics | Learning outcomes 1-4 of the old units are covered |

| New units | | Old units | | Mapping/comments (new topics in italics) |
|---|---|---|---|---|
| **Number** | **Name** | **Number** | **Name** | |
| **Unit 8** | Removable Partial Prosthodontics | **9** | Removable Partial Prosthodontics | Learning outcomes 1-4 of the old units are covered |
| **Unit 9** | Dental Laboratory Compliance | **14** | Quality Assurance in Dental Technology | Learning outcomes 1-3 of the old units are covered<br>In learning outcome 1 the aspect of cross-infection control protocols is added<br>In learning outcome 5 the aspect of waste management is added |
| **Unit 10** | Design of Fixed Prosthodontics | **11** | Design of Fixed Prosthodontics | Learning outcomes 1-4 of the old units are covered |
| **Unit 11** | Complex Dental Materials Science | **12** | Complex Dental Materials Science | Learning outcomes 1-3 of the old units are covered<br>Learning outcome 4 of the old unit is no longer covered<br>In learning outcome 1 the aspect of complex mathematical calculations used in dental technology has been added |
| **Unit 12** | Techniques for Manufacturing Fixed Prosthodontics | **13** | Techniques for Manufacturing Fixed Prosthodontics | Learning outcomes 1-6 of the old units are covered |
| **Unit 13** | Orthodontic Therapy Principles | **15** | Principles of Orthodontic Therapy Regimes | Learning outcomes 1-4 of the old units are covered |
| **Unit 14** | Design, Manufacture and Modification of Orthodontic Appliances | **16** | Design, Manufacture and Modification of Orthodontic Appliances | Learning outcomes 1-5 of the old units are covered |
| **Unit 15** | Advanced Dental Technology Techniques and Procedures | **17** | Advanced Dental Technology Principles and Procedures | Learning outcomes 1-3 of the old units are covered |
| **Unit 16** | Work-based Learning in Dental Technology | **18** | Work-based Learning in Dental Technology | Learning outcomes 1-4 of the old units are covered |

# Annexe E

## Mapping to General Dental Council (GDC) 2012 Learning Outcomes for Dental Technicians

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 1.0 Foundations of Practice | | | | | | | | | | | | | | | | | |
| Describe the principles of an evidence-based approach to learning, professional practice and decision making | 1.1.1 | | | | | ✓ | | | | ✓ | | | | ✓ | | | ✓ |
| Describe the range of normal dental and oral anatomy and physiology | 1.1.2 | | | ✓ | | | | | | | | | | | | | |
| Recognise abnormalities of the oral cavity and their effect on dental devices | 1.1.3 | | | ✓ | | | | | | | | | | ✓ | | | |
| Explain the potential routes of transmission of infectious agents in dental practice, mechanisms for the prevention of infection, the scientific principles of decontamination and disinfection and their relevance to health and safety | 1.1.4 | ✓ | | | | | | | | ✓ | | | | | | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Describe and evaluate the procedures used in the design and manufacture of custom made dental devices | 1.1.5 | ✓ | | | | | | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Describe and evaluate the scientific principles underpinning the use of materials and dental biomaterials and discuss their selection | 1.1.6 | | | | ✓ | | | | | | ✓ | ✓ | | | | | |
| Topic Area: 1.5 Responding to the prescription | | | | | | | | | | | | | | | | | |
| Carry out procedures to meet the prescription | 1.5.1 | ✓ | | | | | | ✓ | ✓ | | | | ✓ | | ✓ | | ✓ |
| Assess the fitness for purpose of custom made dental devices and propose alternative solutions where required | 1.5.2 | ✓ | | | | | | ✓ | ✓ | | | | ✓ | | ✓ | ✓ | ✓ |
| Recognise and take responsibility for establishing personal networks with dental professionals, specialists and other relevant individuals and organisations | 1.5.3 | ✓ | ✓ | | | | ✓ | ✓ | ✓ | | | | ✓ | | ✓ | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Discuss the role of the dental technician and other members of the dental team in the treatment plan | 1.5.4 | | ✓ | | | ✓ | | | | | | | | | | | |
| Explain the principles of obtaining valid patient consent | 1.5.5 | | ✓ | | | ✓ | | | | | | | | | | | ✓ |
| Obtain valid consent from the patient | 1.5.6 | | ✓ | | | ✓ | | | | | | | | | | | ✓ |
| Topic Area: 1.7 Patient management | | | | | | | | | | | | | | | | | |
| Treat all patients with equality, respect and dignity | 1.7.1 | | ✓ | | | | | | | | | | | | | | |
| Explain the impact of medical and psychological conditions in the patient | 1.7.2 | | | ✓ | | | ✓ | | | | | | | | | | |
| Manage patient anxiety, support and reassure patients through effective communication and behavioural techniques | 1.7.3 | | ✓ | | | | | | | | | | | | | | |
| Recognise and take responsibility for understanding the management and organisation of local referral networks, local clinical guidelines and policies | 1.7.4 | | | | | ✓ | ✓ | | | | | | | | | | |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Discuss the role of the dental technician and other members of the dental team in the patient management process | 1.7.5 | | ✓ | | | ✓ | | | | | | | | | | | |
| Topic area: 1.8 Patient and public safety | | | | | | | | | | | | | | | | | |
| Recognise the risks around the working laboratory environment and manage these in a safe and efficient manner | 1.8.1 | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | | | | | | | ✓ |
| Perform effective decontamination and infection control procedures, taking into account its effect on materials | 1.8.2 | ✓ | | | | | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ |
| Take responsibility for ensuring compliance with current best practice guidelines and European manufacturing legislation | 1.8.3 | ✓ | | | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ |
| Recognise and take responsibility for the fitness for purpose of custom made dental devices provided | 1.8.4 | ✓ | | | | | | ✓ | ✓ | | | | ✓ | | ✓ | | ✓ |
| Recognise and manage medical emergencies | 1.8.5 | | ✓ | | | | | | | | | | | | | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Explain the importance of and maintain accurate, contemporaneous and comprehensive patient records in accordance with legal and statutory requirements and best practice | 1.8.6 | | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | | | | | | ✓ |
| Topic area: 1.10 Health promotion and disease prevention | | | | | | | | | | | | | | | | | |
| Describe the principles of preventive care | 1.10.1 | | ✓ | | | | ✓ | | | | | | | | | | |
| Explain how the design and manufacture of custom made dental devices can contribute to the prevention of oral disease and the interests of the patient's long term oral health, safety and well-being | 1.10.2 | | | | | | ✓ | | | | | | | | | ✓ | |
| Evaluate and apply the principles of evidence based and appropriate design in the manufacture and provision of custom made dental devices | 1.10.3 | ✓ | | | | | | ✓ | ✓ | | | | ✓ | | ✓ | ✓ | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 1.14 Manufacture of custom made dental devices | | | | | | | | | | | | | | | | | |
| Design, manufacture, assess and provide biomechanically sound removable devices | 1.14.1 | ✓ | | | | | | ✓ | ✓ | | | | | | | ✓ | |
| Design, manufacture, assess and provide biomechanically sound fixed prostheses | 1.14.2 | ✓ | | | | | | | | | | | ✓ | | | ✓ | |
| Design, manufacture, assess and provide biomechanically sound orthodontic appliances | 1.14.3 | ✓ | | | | | | | | | | | | | ✓ | ✓ | |
| Evaluate, for individual patients, the need for more complex treatment and seek advice | 1.14.4 | | | | | | | ✓ | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Topic area: 1.15 Modification and repair of custom made dental devices | | | | | | | | | | | | | | | | | |
| Repair custom made dental devices to meet the needs of the patient | 1.15.1 | ✓ | | | | | | ✓ | ✓ | | | | | | ✓ | | |
| Repair and modify custom made dental devices | 1.15.2 | ✓ | | | | | | ✓ | ✓ | | | | | | ✓ | | |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 2.0 Population-based health and care | | | | | | | | | | | | | | | | | |
| Explain how social, cultural and environmental factors contribute to general and oral health | 2.1 | | | | | ✓ | ✓ | | | | | | | | | | |
| Describe the dental healthcare systems dental professionals work within including health policy and organisation, delivery of healthcare and equity | 2.2 | | | | | ✓ | ✓ | | | ✓ | | | | | | | |
| Recognise the impact of clinical guidelines relating to the delivery of oral health care on laboratory practice and their implications | 2.3 | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 3.0 Communication - Patients, their representatives and the public | | | | | | | | | | | | | | | | | |
| Communicate appropriately, effectively and sensitively at all times with and about patients, their representatives and the general public where required or as directed and in relation to:<br>• patients with anxious or challenging behaviour<br>• where patients are from diverse backgrounds or there are barriers to patient communication | 3.1 | | ✓ | | | ✓ | | | | | | | | | | | ✓ |
| Recognise the importance of non-verbal communication, including listening skills, and barriers to effective communication | 3.2 | | ✓ | | | ✓ | | | | ✓ | | | | | | | |
| Explain and check patients' understanding of treatments, options, costs and valid consent | 3.3 | | ✓ | | | ✓ | | | | | | | | | | | |
| Obtain valid consent | 3.4 | | ✓ | | | ✓ | | | | | | | | | | | |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 4.0 Team and the wider healthcare environment | | | | | | | | | | | | | | | | | |
| Communicate effectively with colleagues from dental and other healthcare professions in relation to the direct care of individual patients, including oral health promotion. | 4.1 | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | | | | ✓ | | ✓ |
| Explain the role of appraisal, training and review of colleagues, and giving and receiving effective feedback | 4.2 | | ✓ | | | ✓ | ✓ | | | ✓ | | | | | | | |
| Give and receive feedback effectively to other members of the team | 4.3 | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | ✓ | | ✓ |
| Communicate appropriately and effectively in professional discussions and transactions within the health and other sectors | 4.4 | ✓ | ✓ | | | ✓ | | ✓ | ✓ | | | | ✓ | | ✓ | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 5.0 Generic communication skills | | | | | | | | | | | | | | | | | |
| Communicate appropriately, effectively and sensitively by spoken, written and electronic methods and maintain and develop these skills | 5.1 | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ |
| Explain the importance of and maintain accurate, contemporaneous and comprehensive patient records in accordance with legal and statutory requirements and best practice | 5.2 | | | | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ |
| Recognise the use of a range of communication methods and technologies and their appropriate application in support of the practice of dental technology* | 5.3 | | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ |
| Recognise and act within the principles of information governance | 5.4 | ✓ | | | | ✓ | | ✓ | ✓ | ✓ | | | | | | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 6.0 Professionalism - Patients and the public | | | | | | | | | | | | | | | | | |
| Put patients' interests first and act to protect them | 6.1 | ✓ | ✓ | | | | | ✓ | ✓ | | | | ✓ | | ✓ | | ✓ |
| Act with integrity and be trustworthy | 6.2 | ✓ | ✓ | | | | | | | | | | | | | | ✓ |
| Respect patients' dignity and choice | 6.3 | ✓ | ✓ | | | ✓ | | | | | | | | | | | |
| Protect the confidentiality of all personal information | 6.4 | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ |
| Recognise and respect the patient's perspective and expectations of dental care and the role of the dental team, taking into account issues relating to equality and diversity | 6.5 | ✓ | ✓ | | | ✓ | ✓ | | | | | | | | | | |
| Topic Area: 7.0 Ethical and legal | | | | | | | | | | | | | | | | | |
| Be familiar with and act within the GDC's standards and within other professionally relevant laws, ethical guidance and systems | 7.1 | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Recognise and act upon the legal and ethical responsibilities involved in protecting and promoting the health of individual patients | 7.2 | ✓ | ✓ | | | ✓ | | | | ✓ | | | | | | | |
| Act without discrimination and show respect for patients, colleagues and peers and the general public | 7.3 | ✓ | ✓ | | | ✓ | ✓ | | | | | | | | | | ✓ |
| Recognise the importance of candour and effective communication with patients when things go wrong, knowing how and where to report any patient safety issues which arise | 7.4 | | ✓ | | | ✓ | | | | ✓ | | | | | | | |
| Take responsibility for and act to raise concerns about your own of others' health, behaviour or professional performance as described in *Standards for the Dental Team*, *Principle 8.* Raise concerns if patients are at risk | 7.5 | | ✓ | | | ✓ | | | | | | | | | | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 8.0 Teamwork | | | | | | | | | | | | | | | | | |
| Describe and respect the roles of dental and other healthcare professionals in the context of learning and working in a dental and wider healthcare team | 8.1 | | | | | ✓ | ✓ | | | ✓ | | | | | | | ✓ |
| Ensure that any team you are involved in works together to provide appropriate dental care for patients | 8.2 | ✓ | | | | ✓ | | | | ✓ | | | | | | | ✓ |
| Explain the contribution that team members and effective team working makes to the delivery of safe and effective high quality care | 8.3 | | | | | ✓ | ✓ | | | ✓ | | | | | | | |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 9.0 Development of self and others | | | | | | | | | | | | | | | | | |
| Recognise and demonstrate own professional responsibility in the development of self and the rest of the team | 9.1 | ✓ | | | | ✓ | | ✓ | ✓ | | | | ✓ | | ✓ | ✓ | ✓ |
| Utilise the provision and receipt of effective feedback in the professional development of self and others | 9.2 | ✓ | ✓ | | | | | ✓ | ✓ | | | | ✓ | | ✓ | | ✓ |
| Explain the range of learning and teaching methods and the importance of assessment, feedback, critical reflection, identification of learning needs and appraisal in personal development planning | 9.3 | | | | | | | | | ✓ | | | | | | | ✓ |
| Develop and maintain professional knowledge and competence and demonstrate commitment to lifelong learning | 9.4 | | | | | ✓ | | | | | | | | | | | ✓ |
| Recognise and evaluate the impact of new techniques and technologies in the practice of dental technology | 9.5 | | | | | | | ✓ | ✓ | | | | ✓ | | ✓ | ✓ | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accurately assess own capabilities and limitations in the interest of high quality patient care and seek advice from supervisors or colleagues where appropriate | 9.6 | ✓ | | | | | | ✓ | ✓ | | | | ✓ | | ✓ | | ✓ |
| Describe and demonstrate the attributes of professional attitudes and behaviour in all environments and media | 9.7 | | | | | ✓ | | | | | | | | | | | ✓ |
| Topic area: 10.0 Management and leadership - Managing self | | | | | | | | | | | | | | | | | |
| Put patients' interests first and act to protect them | 10.1 | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ |
| Effectively manage own time and resources | 10.2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Recognise the impact of personal behaviour and manage this professionally | 10.3 | | ✓ | | | ✓ | | | | | | | | | | | ✓ |
| Recognise the significance of the management and leadership role and the range of skills and knowledge required to do this effectively | 10.4 | | ✓ | | | ✓ | | | | ✓ | | | | | | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Recognise the importance of managing the delivery of dental technology and the range of skills and knowledge required to do this effectively | 10.5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Take responsibility for personal development planning, recording of evidence, and reflective practice | 10.6 | | | | | ✓ | | | | | | | | | | | ✓ |
| Ensure that all aspects of practice comply with legal and regulatory requirements | 10.7 | ✓ | | | | ✓ | | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | ✓ |
| Demonstrate appropriate continuous improvement activities | 10.8 | ✓ | | | | | | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | ✓ |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic area: 11.0 Working with others | | | | | | | | | | | | | | | | | |
| Recognise the need for a patient-centred approach when working with the dental and wider healthcare team | 11.1 | | ✓ | | | ✓ | | | | | | | | | | | ✓ |
| Recognise and respect own and others' contribution to the dental and wider healthcare team and demonstrate effective team working | 11.2 | | | | | ✓ | | | | | | | | | | | ✓ |
| Recognise and demonstrate personal accountability to the regulator, the team and wider community | 11.3 | | ✓ | | | ✓ | ✓ | | | | | | | | | | ✓ |
| Recognise and comply with the team working requirements in the Scope of Practice and Standards documents | 11.4 | | | | | ✓ | | | | | | | | | | | ✓ |
| Describe the impact of Direct Access on each registrant group's scope of practice and its effect on dental team working | 11.5 | | ✓ | | | ✓ | | | | ✓ | | | | | | | |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Recognise, take responsibility for and act to raise concerns about your own or others' health, behaviour or professional performance as described in *Standards for the Dental Team Principle 8* | 11.6 | | ✓ | | | ✓ | | | | ✓ | | | | | | | |
| Topic area: 12.0 Managing the clinical and working environment | | | | | | | | | | | | | | | | | |
| Recognise and comply with systems and processes to support safe patient care | 12.1 | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ |
| Recognise the need for effective recorded maintenance and testing of equipment and requirements for appropriate storage, handling and use of materials | 12.2 | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | | ✓ |
| Recognise and demonstrate the procedures for handling of complaints as described in *Standards for the Dental Team Principle 5* Have a clear and effective complaints procedure | 12.3 | | | | | ✓ | | | | ✓ | | | | | | | |

| GDC Learning Outcome | Ref | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 | Unit 9 | Unit 10 | Unit 11 | Unit 12 | Unit 13 | Unit 14 | Unit 15 | Unit 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Describe the legal, financial and ethical issues associated with managing a dental practice | 12.4 | | | | | ✓ | | | | ✓ | | | | | | | |
| Recognise and comply with national and local clinical governance and health and safety requirements | 12.5 | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | | ✓ |

# Annexe F

## Mapping to Level 3 Apprenticeship in Dental Laboratory Assistant competencies

### BTEC Level 3 Diploma in Dental Technology QCF mapping to Level 3 Apprenticeship in Dental Laboratory Assistant competencies

| Level 3 Apprenticeship in Dental Laboratory Assistant competencies | | BTEC Level 3 Diploma in Dental Technology QCF unit Identification | | | | |
|---|---|---|---|---|---|---|
| **Knowledge** | | **1** | **2** | **3** | **4** | **5** |
| Oral Anatomy | The basic understanding of normal dental/oral anatomy and physiology. | | | ✓ | | |
| Material Selection and uses | The principles regarding the use of basic materials in the manufacture custom made dental devices. | ✓ | | | ✓ | |
| The Dental Team | A thorough understanding of the role of Dental Technicians and other dental team members in patient management. | | ✓ | | | ✓ |
| Health and Safety Compliance and associated regulatory requirements | The appropriate Health and Safety guidance related to the Dental Laboratory workplace and how to follow these. | | ✓ | | | ✓ |
| | How to utilise appropriate Personal Protective Equipment. | | ✓ | | | |
| | The need for compliance with the Medical Devices Regulation and associated GDC guidelines such as Standards for Dental Professionals, Scope of Practice and Team working. | | | | | ✓ |

| Level 3 Apprenticeship in Dental Laboratory Assistant competencies | | | BTEC Level 3 Diploma in Dental Technology QCF unit Identification | | | | |
|---|---|---|---|---|---|---|---|
| **Skills** | | | **1** | **2** | **3** | **4** | **5** |
| Appropriate Device Process | | Recognise manufacturing requirements and meet the clinical standards for custom made dental devices, referring for advice from the Dental Technician as appropriate. | ✓ | | | | |
| Device Manufacture<br>Assist Dental Technicians with some primary manufacturing stages, repairs, and modifications of conservation, prosthetic and orthodontic custom made dental devices, in line with individual patient prescriptions provided by the dentist, as defined in the following three areas: | 1. Prosthetic Device Manufacture (Dentures) | Produce basic Casts/ Models fabricated accurately for prosthetic areas of appliance manufacture. | ✓ | | | | |
| | | Produce occlusal rims and bases for complete and partial removable prosthetic cases. | ✓ | | | | |
| | | Produce simple upper and lower special impression trays for actual patient cases. | ✓ | | | | |
| | | Set up a full upper to existing lower and a full lower to existing upper case. | ✓ | | | | |
| | | Set up a simple temporary partial prosthesis. Repair a simple fractured removable prosthesis. | ✓ | | | | |
| | | Convert wax try-in dentures to a hard denture base by a conventional method. | ✓ | | | | |
| | 2. Conservation Device Manufacture (Crown and Bridge) | Produce simple single tooth shaped restorations in wax. | ✓ | | | | |
| | | Produce a simple temporary restoration in a tooth coloured material. Create a post and core substructure. | ✓ | | | | |
| | | Produce a component related to a conservation restoration ready for quality assurance review. | ✓ | | | | |
| | 3. Orthodontic Device Review (Braces) | Produce models for appliance construction. | ✓ | | | | |
| | | Manufacture the basic wire components of a removable orthodontic appliance. Produce a simple orthodontic retainer. | ✓ | | | | |
| | | Manufacture tooth whitening stents, gum shields and similar items to the prescription and for Quality Assurance by the Dental Technician. | ✓ | | | | |
| Communication | | Communicate effectively in the dental laboratory in both written and spoken word and is aware of the importance of good communication within the dental team and dental laboratory personnel. | | ✓ | | | |
| Decontamination & Infection Control | | Manage safety and decontamination risks around the laboratory by carrying out decontamination and infection control procedures, whilst taking into account their effect on materials. | ✓ | ✓ | | | |

# Annexe G

## Examples of calculating qualification grade above pass grade

Pearson will automatically calculate the qualification grade for learners when unit grades are submitted.

The generic examples below demonstrate how the qualification grade above pass is calculated.

## Points available for unit credits achieved at different levels and unit grades

The table below shows the **number of points scored per unit credit** at the unit level and grade.

| Unit QCF level | Points per unit credit | | |
|---|---|---|---|
| | Pass | Merit | Distinction |
| Level 2 | 5 | 6 | 7 |
| **Level 3** | **7** | **8** | **9** |
| Level 4 | 9 | 10 | 11 |

Learners who achieve the correct number of points within the ranges shown in the 'qualification grade' table below will achieve the qualification merit, distinction or distinction* grades (or combinations of these grades appropriate to the qualification).

### Qualification grade

#### BTEC Level 3 Subsidiary Diploma

| Points range above pass grade | Grade | |
|---|---|---|
| 460-499 | Merit | M |
| 500-519 | Distinction | D |
| 520 and above | Distinction* | D* |

#### BTEC Level 3 Diploma

| Points range above pass grade | Grade |
|---|---|
| 880-919 | MP |
| 920-959 | MM |
| 960-999 | DM |
| 1000-1029 | DD |
| 1030-1059 | DD* |
| 1060 and above | D*D* |

### Example 1

**Achievement of distinction qualification grade**

A learner completing a 60-credit Pearson BTEC Level 3 Subsidiary Diploma achieves the points required to gain a distinction qualification grade.

| | Level | Credit | Grade | Grade points | Points per unit = credit x grade |
|---|---|---|---|---|---|
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 2 | 10 | Distinction | 7 | 10 × 7 = 70 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| **Qualification grade totals** | | **60** | **Distinction** | | **500** |

### Example 2

**Achievement of distinction merit qualification grade**

A learner completing a 120-credit Pearson BTEC Level 3 Diploma achieves the points required to gain a distinction merit qualification grade.

| | Level | Credit | Grade | Grade points | Points per unit = credit x grade |
|---|---|---|---|---|---|
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 2 | 10 | Distinction | 7 | 10 × 7 = 70 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| Unit X | 4 | 10 | Merit | 10 | 10 × 10 = 100 |
| Unit X | 3 | 10 | Pass | 7 | 10 × 7 = 70 |
| Unit X | 3 | 10 | Pass | 7 | 10 × 7 = 70 |
| Unit X | 3 | 20 | Merit | 8 | 20 × 8 = 160 |
| **Qualification grade totals** | | **120** | **Distinction Merit** | | **980** |

### Example 3

#### Achievement of merit qualification grade

A learner completing a 180-credit Pearson BTEC Level 3 Extended Diploma achieves the points required to gain a merit qualification grade.

| | Level | Credit | Grade | Grade points | Points per unit = credit x grade |
|---|---|---|---|---|---|
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 3 | 10 | Pass | 7 | 10 × 7 = 70 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 3 | 10 | Pass | 7 | 10 × 7 = 70 |
| Unit X | 2 | 10 | Distinction | 7 | 10 × 7 = 70 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 4 | 10 | Pass | 9 | 10 × 9 = 90 |
| Unit X | 3 | 10 | Pass | 7 | 10 × 7 = 70 |
| Unit X | 3 | 10 | Pass | 7 | 10 × 7 = 70 |
| Unit X | 3 | 10 | Pass | 7 | 10 × 7 = 70 |
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 3 | 20 | Pass | 7 | 20 × 7 = 140 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| Unit X | 3 | 10 | Merit | 8 | 10 × 8 = 80 |
| Unit X | 3 | 10 | Distinction | 9 | 10 × 9 = 90 |
| **Qualification grade totals** | | **180** | **Merit Merit Merit** | | **1410** |

**April 2019**

**For information about Pearson Qualifications, including Pearson Edexcel, BTEC and LCCI qualifications visit qualifications.pearson.com**



**Pearson Education Limited. Registered in England and Wales No. 872828**
**Registered Office: 80 Strand, London WC2R 0RL.**

**VAT Reg No GB 278 537121**