

# Unit 38: Dermatology and Microbiology

**Unit code:** T/601/4460  
**QCF Level 3:** BTEC Nationals  
**Credit value:** 5  
**Guided learning hours:** 42

## ● Aim and purpose

This is a preparation for work unit, which is based on capability and knowledge. This unit is about dermatology and microbiology. Learners will develop knowledge about the structures, functions, diseases and disorders of the skin, hair and nails, and factors affecting their growth. Learners will also culture bacteria and relate this to salon hygiene.

This unit applies to the hair and beauty sector.

## ● Unit introduction

Dermatology and microbiology play a vital role in the hair and beauty sector. Knowledge and understanding of the skin, hair and nails is essential in order to provide hairdressing and beauty therapy services/treatments. An understanding of microbiology will enable learners to appreciate how micro-organisms, such as bacteria, transfer and spread infection. Learners will be able to relate this understanding to working practices in the salon environment to help minimise the risk of infection.

In this unit, learners will explore the structure and function of the skin, hair and nails. They will also study the diseases and disorders of the skin, hair and nails.

Learners will develop the ability to prepare to culture bacteria, so they can then investigate the conditions required for the successful growth of bacteria and relate this to salon hygiene.

## ● Learning outcomes

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

- 1 Know the structure and functions of the skin, hair and nails
- 2 Know the diseases and disorders of the skin, hair and nails
- 3 Be able to prepare for the culturing of bacteria
- 4 Be able to investigate the conditions required for the successful growth of bacteria and relate this to salon hygiene.

# Unit content

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## 1 Know the structure and functions of the skin, hair and nails

*Structure of skin:* epidermis (stratum corneum, stratum lucidum, stratum granulosum, stratum spinosum, stratum germinativum); dermis (papillary layer, reticular layer); subcutaneous layer (lipocytes)

*Structure of hair:* types of hair (vellus, terminal); cuticle; medulla; cortex

*Structure of nails:* matrix; mantle; nail bed; lunula; lateral nail fold; nail groove; nail plate; nail wall; cuticle (eponychium, perionychium); hyponychium; free edge

*Functions of skin, nails and hair:* skin (protection (physical, chemical, against ultraviolet light) defence, sensitivity, heat regulation, production of vitamin D); nails (protection, enhancing sensation, increasing dexterity); hair (insulation, protection, soaking up sweat, differentiation between the sexes)

*Factors that affect growth of terminal hair and nails:* hair growth (anagen, catagen, telogen); nail growth (keratinisation); diet; seasonal changes; endocrine disorders; changes associated with ageing; trauma

*Factors that cause ageing of skin:* biological; collagen and elastin structure; environmental exposure to prolonged sunlight; smoking; poor diet

## 2 Know the diseases and disorders of the skin, hair and nails

*Diseases and disorders (contraindications) of skin:* non-infectious (dermatitis, eczema, naevi, vitiligo, chloasma, psoriasis, sebaceous cysts, acne vulgaris, milia, acne rosacea, basal cell carcinoma, melanoma); infectious (folliculitis, carbuncle, impetigo, warts, herpes simplex, herpes zoster, candida, tinea pedis, scabies); signs (appearance, redness, weeping, dry patches, itchiness); causes (directly by cross-contamination from person to person, indirectly by cross-contamination from towels, couch covers, hormonal influences, allergies, poor hygiene, poor diet)

*Diseases and disorders (contraindications) of hair:* non-infectious eg alopecia, dandruff endocrinerelated; infectious eg lice infestation; signs (appearance, redness, weeping, dry patches, itchiness); causes (directly by cross-contamination from person to person, indirectly by cross contamination from towels, couch covers, hormonal influences, allergies, poor hygiene, poor diet)

*Diseases and disorders (contraindications) of nails:* non-infectious eg abnormal colouration, hangnail, ingrowing nails; infectious eg contact dermatitis; signs (appearance, redness, lines or grooves, white spots, bruising, black lines, discolouration); causes (directly by cross-contamination from person to person, indirectly by cross-contamination from towels, couch covers, hormonal influences, allergies, poor hygiene, poor diet, trauma to the nail)

## 3 Be able to prepare for the culturing of bacteria

*Preparation:* of themselves; of work area; laboratory requirements (sterilising equipment)

*Materials, tools and equipment:* solid medium (agar); broth; selective media; petri dishes; loops; culture tubes; incubator; protective clothing, cotton swabs

*Experiment:* process of culturing bacteria (batch, continuous, plates, slopes, stabs, streaks); handling techniques

#### 4 Be able to investigate the conditions required for the successful growth of bacteria and relate this to salon hygiene

*Health and safety practices:* safe handling of micro-organism; safe disposal of contaminated material

*Investigation:* measurement (total cell count, viable cell count, serial dilution)

*Conditions required for cultivating bacteria:* water; nutrition; temperature; pH; oxygen; osmotic factors

*Micro-organisms:* bacteria; viruses; fungi; protoctista; parasites

*Structure of micro-organisms:* bacteria shapes (bacilli, spirilla, cocci); bacterium cell structure (cell wall, capsule, flagella, nucleoid, endospores, cytoplasm, plasma membrane, ribosomes, granules); virus cell structure (capsid, nucleic acid, protein envelope); fungus cell structure (dermatophytes, pseudomycelium, chlamydospores, buds, hyphae, filamentous, septa)

*Life cycle and transmission of micro-organism:* life cycle (reproduction (asexual, sexual), growth curve); transmission (direct, indirect, ingestion, airborne, vectors, droplets, body fluids, contaminated objects)

*Hygiene procedures in salon:* health and safety (handling techniques, aseptic techniques, sterilisation and sanitation methods, correct clothing, disposal of contaminated materials, heat treatment, disinfectants, UV treatment, irradiation)

## 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:
<b>P1</b> identify the anatomical structures of the skin, nails and hair	<b>M1</b> explain how the structure of skin, hair and nails affects its properties and helps it perform its functions	<b>D1</b> compare how the structure of skin, hair and nails affects its properties and helps it perform its functions at different stages in life
<b>P2</b> describe the functions of the skin, nails and hair		
<b>P3</b> describe the factors that affect the growth of hair and nails [IE5]		
<b>P4</b> describe the factors that cause changes in the appearance of the skin, which are associated with ageing [IE5]		
<b>P5</b> describe the signs and causes of non-infectious diseases and disorders of the skin, hair and nails that contraindicate treatment [IE2]	<b>M2</b> compare and contrast at least two diseases and disorders of the skin, hair and nails that contra-indicate hair or beauty-related treatments	
<b>P6</b> describe the signs and causes of infectious disorders of the skin hair and nails that contraindicate treatment [IE2]		
<b>P7</b> prepare themselves and the work area for the culturing of bacteria [TW5, SM3]		
<b>P8</b> select materials, tools and equipment needed to culture bacteria [SM3]		

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:
<b>P9</b> devise an experiment to culture bacteria [CT1]	<b>M3</b> explain the experiment to culture bacteria	<b>D2</b> evaluate the experiment to culture bacteria
<b>P10</b> describe the laboratory requirements for preparing themselves and the work area for culturing bacteria		
<b>P11</b> explain how to select materials, tools and equipment needed to culture bacteria		
<b>P12</b> describe the process of culturing bacteria		
<b>P13</b> follow health and safety working practices when investigating the culturing of bacteria [SM4]		
<b>P14</b> carry out tests to investigate the conditions required for the successful growth of bacteria [TW5]		
<b>P15</b> explain how to follow health and safety working practices when investigating the culturing of bacteria		
<b>P16</b> describe the conditions required to successfully cultivate bacteria [IE6]	<b>M4</b> explain the conditions required to cultivate bacteria successfully.	<b>D3</b> evaluate how good hygiene procedures are designed to reduce the risks associated with bacteria in the salon.
<b>P17</b> describe the structure, lifecycle and transmission of micro-organisms		
<b>P18</b> describe hygiene procedures that can be used to reduce the risk of cross-contamination in the salon.		

**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.

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

# Essential guidance for tutors

## Delivery

Learning outcome 4 could be delivered using a mixture of lectures from tutors and learner guided research. Some laboratory work, such as carrying out experiments on hair could also be included and is desirable. Learners could examine, or make for themselves, models showing the structure of skin and hair.

For learning outcome 2, illustrated lectures could be used. These could be delivered by tutors, by visiting experts, or by learners themselves after first carrying out research. It would be very useful for learners to see actual examples of diseases such as psoriasis and eczema if this could be arranged.

Learning outcomes 3 and 4 should be delivered in a laboratory. There will need to be some tutor input and an element of demonstration, but much of the learning should be through practical activities carried out by learners themselves. The importance of health and safety should be stressed throughout, and learners should be encouraged to relate what they learn to the salon.

Interactive science software could provide a visual insight into how bacteria multiply. The creation of cross-section 3D models of the skin, hair and nails would provide the opportunities for multi-sensory activities, such as washing up sponges, for layers of the skin, string for the sweat glands, copper wire for hairs and so on.

Alternatively, group work could be encouraged. Learners could create large wallcharts of the structure of the skin, hair and nails with the names separate as labels that can be stuck on/attached to the wall chart. Or learners could create board games based on the structure of these appendages. These activities would be a valuable learning aid that was both visual and fun to create.

Guest speakers, such as dermatologists or dermatology students and bacterial scientists from universities, could give talks and demonstrations on ageing and infectious and non-infectious diseases. Alternatively, learners could visit them in their place of work to watch them carry out experiments.

## 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 and/assessment
Tutor introduction to the unit.
<b>Assignment 1: Skin, Nails, and Hair (P1, P2, P3, P4, P5, P6, M1, M2, D1).</b>
Tutor introduction to assignment brief.
Use of task sheets, textbooks and diagrams relating to the structure and functions of the skin, hair and nails.
Factors that affect growth of terminal hair and nails. Factors that cause ageing of skin.
Infectious and non-infectious diseases and disorders of the skin, hair and nails.
Group discussions and presentations of findings.
Assignment workshop(s).

## Topic and suggested assignments/activities and/assessment

**Assignment 2: Salon Hygiene (P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, M3, M4, D2, D3).** Tutor introduction to assignment brief.

Preparation for culturing of bacteria. Materials, tools and equipment. Techniques and methods.

Experiment to culture bacteria. Health and safety practices.

Practical investigation. Conditions required for cultivating bacteria.

Micro-organisms (type, structure, life cycle, transmission).

Hygiene procedures in the salon.

Assignment workshop(s).

Tutor recap of unit, using games and quizzes.

## Assessment

The unit is assessed by the centre and will be subject to external verification by Edexcel.

Achievement of the assessment and grading criteria should be evidenced through contextualised, vocationally-related experiences, with tasks specifically designed with the assessment and grading criteria in mind.

The theoretical aspects of assessment for this unit can be achieved through learners completing centre-devised assignments, a portfolio of evidence or through adaptation of Edexcel assignments where available. Practical assessment criteria will require observation and completion of relevant documentary evidence by the assessor.

Assessment should be as holistic as possible, with assignments designed to cover multiple assessment criteria, even across units, where appropriate. Reference to grading criteria should be made in the assessment documentation, to ensure the criteria have been met.

P1, P2, P3, P4, P5, P6, M1, M2 and D1 assess learners' knowledge and understanding of dermatology and microbiology in relation to hair and beauty treatments. Learners could achieve these criteria by producing a guide for new beauty therapists on the structure and function of the skin, hair and nails, and how to recognise different diseases/disorders. P1 can be achieved through labelling diagrams provided by the tutor or learners can draw their own. It should be remembered, however, that learners ability to draw is not being assessed. M1 and D1 require learners to relate the structure of the skin, hair and nails to their function(s).

P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18 and M3, learners could prepare for and conduct an investigation to culture bacteria, investigating the conditions required for the successful growth of bacteria and relating it to salon hygiene.

P7, P8, P13 and P14 require learners to prepare for and carry out tests to investigate the conditions required for the successful growth of bacteria. Learners' practical performance must be observed and evidenced with a signed witness testimony.

Learners can achieve P9, P10, P11, P12, P15, P16, P17, P18, M4, D3, D4 and D5 by producing a written report of the investigation and the conclusions drawn.

It is essential that learners are given opportunities to achieve all the assessment and grading criteria through the assignments. The theoretical aspects of this unit, such as anatomy and physiology, lend themselves to cross-unit assessment.

It is recommended good practice for tutors to hold regular assignment workshops where learners bring in their assignment work and work on it, consulting with the tutor when necessary.

Signed witness testimonies and observation records must be retained for verification purposes.

Supplementary evidence in the form of photographs could also be provided.



## 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, P2, P3, P4, P5, P6, M1, M2, D1	Skin, Nails and Hair	Prepare a guide for new beauty therapists on the structure and function of the skin, hair and nails, and how to recognise different diseases/disorders.	Written guide, with pictures and diagrams, marked and authenticated by the assessor.
P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, M3, M4, D2, D3	Salon Hygiene	Investigate the conditions required for successful growth of bacteria and relate this to salon hygiene and produce a report.	Practical observation, with signed witness testimony. Written report of investigation.

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

This unit forms part of the BTEC hair and beauty sector suite. This unit has particular links with the following unit titles in the hair and beauty suite:

Level 2	Level 3
The Living Body	Nutrition for Beauty Therapy
Provide Facial Skincare	

## Essential resources

Learners will need access to a laboratory to culture bacteria. They will not require equipment other than that normally found in a laboratory equipped for GCSE science, but this should include a refrigerator, incubator and petri dishes. There should be provision made for the safe disposal of contaminated material.

## Employer engagement and vocational contexts

Guest speakers from the hair and beauty sector, such as facialists and health and safety officers, would be beneficial to learners.

## Indicative reading for learners

### Textbooks

Buxton P K and Morris-Jones R – *ABC of Dermatology 5th Edition* (Wiley-Blackwell, 2009)  
ISBN 9781405170659

Gawkrodger D – *Dermatology: An Illustrated Colour Text 4th Edition* (Churchill Livingstone, 2007)  
ISBN 9780443104213

Ronald M and Motley R – *Common Skin Diseases 18th Edition* (Hodder Arnold, 2010) ISBN 9780340983508

Tortora G J, Funke B et al – *Microbiology: An Introduction 10th Edition* (Pearson Education, 2009)  
ISBN 9780321584205

Weller R, Hunter J A et al – *Dermatology 4th Edition* (Wiley-Blackwell, 2008) ISBN 9781405146630

### Journals and magazines

*Habia News* (Seed Publishing Limited)

*Hairdressers Journal International* (Reed Business Information)

*Health and Beauty Salon Magazine* (Reed Business Information)

### Websites

[www.dermatology.about.com](http://www.dermatology.about.com)

Dermatology

[www.dermnetnz.org/bacterial](http://www.dermnetnz.org/bacterial)

Bacterial skin infections

[www.doctorfungus.org](http://www.doctorfungus.org)

Health

[www.habia.org](http://www.habia.org)

Habia, the Standards Setting Body for the hair and beauty sector

[www.netdoctor.co.uk](http://www.netdoctor.co.uk)

Health and wellbeing

## 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 ...
<b>Independent enquirers</b>	considering the factors that influence the growth of hair and nails and cause changes in the ageing of the skin [IE5] carrying out research into the signs and causes of diseases and disorders of the skin, hair and nails that contraindicate treatment [IE2] describing conditions required to cultivate bacteria successfully [IE6]
<b>Creative thinkers</b>	generating ideas and exploring possibilities for culturing bacteria [CT1]
<b>Team workers</b>	taking responsibility for preparing themselves and work area for culturing bacteria, and carrying out tests to investigate the conditions required for the successful growth of bacteria [TW5]
<b>Self-managers</b>	organising materials, tools and equipment needed to culture bacteria [SM3] anticipating and managing risks by following health and safety working practices. [SM4]

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 ...
<b>Independent enquirers</b>	analysing the results from experiments with bacteria [IE4]
<b>Creative thinkers</b>	asking questions about the conditions required to cultivate bacteria [CT2]
<b>Reflective learners</b>	evaluating the experiment conducted to culture bacteria [RL5]
<b>Self-managers</b>	working towards goals set by the tests [SM2]
<b>Effective participators</b>	discussing issues of concern when conducting experiments, seeking resolution where needed. [EP1]

## ● Functional Skills – Level 2

Skill	When learners are ...
<b>ICT – Finding and selecting information</b>	
Use appropriate search techniques to locate and select relevant information	researching dermatology and microbiology
<b>ICT – Developing, presenting and communicating information</b>	
Enter, develop and refine information using appropriate software to meet requirements of a complex task	recording results of experiments and the investigation
Combine and present information in ways that are fit for purpose and audience	presenting the investigation
<b>Mathematics</b>	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	devising experiments to culture bacteria
Draw conclusions and provide mathematical justifications	interpreting the experiment results and making conclusions about the conditions needed for the successful growth of bacteria
<b>English</b>	
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	producing a written report of the investigation.