Pearson
Higher Nationals in

Engineering / Nuclear Engineering / Aeronautical Engineering

PEARSON-SET ASSIGNMENT

UNIT: 35 Professional Engineering Management (Pearson-set)

For use with the following qualifications:

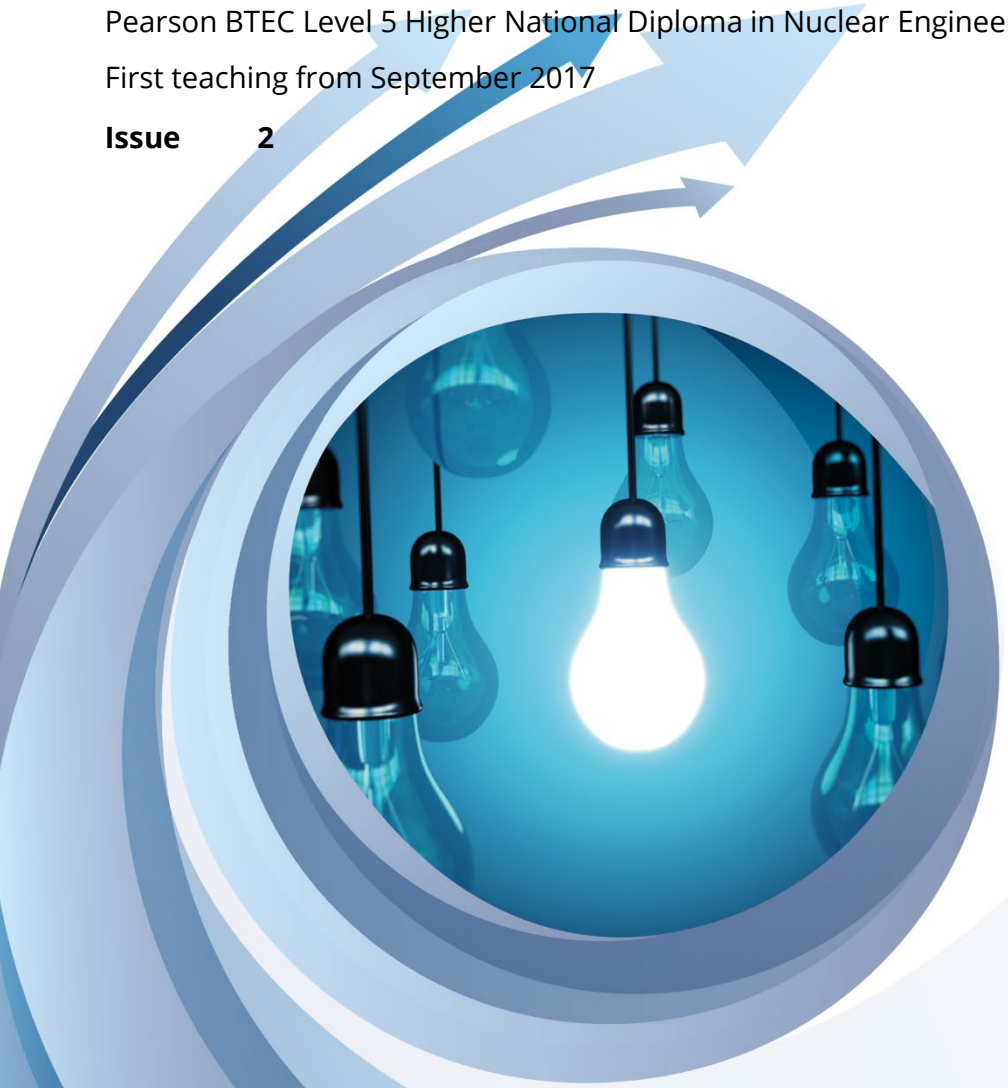
Pearson BTEC Level 5 Higher National Diploma in Engineering

Pearson BTEC Level 5 Higher National Diploma in Aeronautical Engineering

Pearson BTEC Level 5 Higher National Diploma in Nuclear Engineering

First teaching from September 2017

Issue 2



Edexcel, BTEC and LCCI qualifications

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Unit Planning

The aim of this unit is to offer students an insight into the professional standards maintained by engineers and to guide them on how to develop the range of employability skills needed by practicing engineers.

The unit also encourages students to reflect on their personal commitment to professional engineering standards in conjunction with their obligations to society and the environment.

In conjunction with their tutor, students will choose their own project focus for the development of an engineering service/s delivery plan, based on a theme provided by Pearson (this will change annually). The focus area must be related to their specialist pathway of study (or where a student is studying the General Engineering, to the underlying aims of the centre's programme). This will enable students to construct a coherent engineering service/s delivery plan to meet the needs of their chosen area.

Centres should consider the best way to deliver the unit according to the needs of the students. Deliverers could be tutors, appropriate members of the engineering institutes or representatives from local relevant industrial sectors. Possible delivery methods include whole-class teaching, small group teaching, or e-learning.

The unit should be taught in the way(s) most appropriate to the students and the centre. Some suggestions include:

- A block of lessons at the start of the course
- Lessons throughout the course
- Small-group teaching, focusing on relevant aspects
- Teaching of, or seminars on, project management and/or subject specific skills delivered by external experts.

Delivery should include the development of:

- Strategic planning and the techniques adopted to effectively manage teams
- Total Quality Management (TQM), logistics and supply chain management
- Engineering social and ethical responsibility
- Decision making and risk management tactics
- Technical report writing, investigative field study, and appropriate presentation skills.

Please note that there is a suggested scheme of work for this available at HN Global at www.highernationals.com

The role of the Tutor

All students should have initial guidance in planning their work and regular monitoring meetings. However, when reviewing drafts of students' work, tutors should ensure they use their professional judgement and not give excessive guidance. The student should meet individually with their tutor to monitor the development of their plan and ensure it is progressing in an appropriate direction and at a pace which will enable the student to meet the assessment requirements. Students will perform best if some time is allocated within the normal centre timetable for working on the brief. The tutor must be able to authenticate the work as the student's own, which can be done by regular monitoring of progress and conducting interim reviews.

Milestones and interim feedback

The purpose of milestones is to monitor the progress of the delivery plan and to maintain momentum, making it more likely that it will succeed. Each milestone should be a clear, achievable activity that the student aims to achieve by a particular time. By partaking in structured, timely meetings and feedback sessions in this unit, the students will realise first-hand the benefits of implementing a similar approach in their own professional careers.

Students should agree at least two milestones with their tutor. Examples of milestones include:

- completing underpinning industrial research in their chosen pathway
- completing and discussing their area of focus
- producing an overview of the anticipated issues/ problems

At each milestone, the tutor liaises with the student to check whether it has been achieved. They may need to redirect the student if necessary.

Authentication of a submission

Centres are to provide confirmation of the authenticity of the engineering service/s delivery plan. It is important that students are made aware of the issue of plagiarism at the onset of the unit. Students are required to sign a declaration stating that the work they are submitting is their own.

Centres may wish to take advantage of readily available anti-plagiarism detection software to ensure the originality of student work.

Guidance for Tutors

The chosen area for the development of an engineering services/s delivery plan for this unit must be based on a proposal defined by the student.

- The student must agree and sign off their proposal with you before embarking on the development of their engineering service/s delivery plan. If this requires extra time to agree, this could be addressed through the student's tutorial time. On the following pages, there is an example of a project proposal.
- Students must complete the engineering service/s delivery plan in order to complete their work for this unit.
- Group work is not appropriate for this unit. Student work must be individual.
- Students should be taught the underpinning knowledge that will enable them to rationally confront the management of a project, construct a coherent engineering service/s delivery plan, cultivate leadership skills and present their findings in the form of a technical report.
- It is advisable to direct students to appropriate research sources and advise on qualitative and quantitative methods.
- Students will need to reflect on the success of their undertakings and their performance at the end of the plan, with the inclusion of an insightful evaluation and targeted recommendations.
- The project undertaken must incorporate the following topics:
    - An assessment of risk evaluation associated with project management
    - The production of an engineering service/s delivery plan
    - Development of both leadership and communication skills
    - A personal commitment to professional standards which encompasses the need for reflection.

The above list is not exhaustive. The students will undoubtedly need more support in the early stages of the project and you must ensure that the area of focus that they select will provide sufficient scope to satisfy the all of the learning outcomes.

Guidance for Students

You should read this information before starting to define your proposed area of focus and refer to it as you complete the work for this unit.

- Develop a methodical proposal (see below for an example of a proposal brief). As you will need to include an engineering service/s delivery plan as an integral part of your submission, you should be simultaneously considering the impact on stakeholders and what performance measures you envisage employing.
- Select a topic of personal interest in your chosen specialism. The topic chosen should allow a sufficient and suitable degree of research through the existence of adequate background information. You will need to ensure it relates to the theme set by Pearson for the relevant year of study.
- A good proposal should meet the following criteria:
    - Covers an area with sufficient source material.
    - Extends a current line of learning that will lend itself to further rigorous scrutiny. There should be sufficient breadth to allow you to demonstrate the knowledge and skills you have learned within the unit, but it should not be unwieldy so that you are unlikely to be able to see it through to completion.
- Agree both your proposal and the format that your engineering service/s delivery plan will take with your tutor before beginning the main body of your research.
- Conduct your underpinning background research as outlined in the proposal agreed with your tutor.
- Communicate your findings and proposals in a manner appropriate to your audience. You will also be expected to justify any appropriate recommendations that you make.
- You must complete a coherent engineering service/s delivery plan in order to complete your work for this unit.
- You will need to reflect on your own performance at the end of the unit with the inclusion of self-evaluation by means of reflective practice (see following section)

On the following pages, there is an example of a proposal brief.

Proposal Brief

- Define your chosen specialist topic area of investigation. This can be stated as a problem, objectives or simply as a question. Choose your topic area with great care, remember that you'll need to construct a resilient engineering service/s delivery plan to fully illustrate how the project will be delivered.
- Provide a written outline of your proposal for agreement with your tutor before you engage in the main body of the work.
- Describe your methodology. You'll need to demonstrate an understanding of the pitfalls and limitations of the methods chosen and ethical issues that a professional engineer faced with similar problems may encounter.
- Your engineering service/s delivery plan is an integral part of how you're going to tackle the problem. A well-defined service delivery plan helps to explain how the project is to be delivered. Below are several aspects you will need to consider when constructing your service delivery plan:

    1. A detailed task breakdown
    2. Challenges: both planned and unforeseen
    3. Assessment and feasibility studies (links to risk evaluation)
    4. Responsibility for completion
    5. External & internal pressures: costs, impact on other services/ users
    6. Impact on stakeholders if not undertaken
    7. Performance measures
    8. Project team management strategies and considerations
    9. Start date/time of individual task and project
    10. Finish date/ time of individual task and project

Remember, the above list is not exhaustive. Every engineering service/s delivery plan will be unique, so make sure yours is fit for purpose.

- Consider the impact of effectively managing the people involved both directly and indirectly with the project. How would you ensure the team remain focussed in achieving the desired goal(s)?
- Consider how you will communicate the outcomes to the identified audience. As well as documenting your findings in a professional engineering report, you will need to bear in mind the essential key points required to deliver an effective presentation.

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Proposal Form Template

Student Team	
Student Name	Student Number

Date _____

Centre Name _____

Tutor _____

Proposed Title _____

Section One: Title, aims, objectives
Title or working title of plan (in the form of a question, objective or hypothesis) Aims and objectives (e.g. what do you wish to achieve? What do you want to learn to do? What do you want to find out?)
Section Two: Reasons for choosing this specific area of engineering
Reasons for choosing the are (e.g. links to other subjects you are studying, personal interest, future plans, knowledge/skills you want to improve, why the topic is important?):
Section Three: Information sources searched
Use of key information sources to support your background research

Section Four: Activities and timescales	
Activities to be carried out during the construction of the project (e.g. research, development, analysis of ideas, writing, data collection, numerical analysis, tutor meetings, production of final outcome, evaluation, writing the report) and likely durations:	How long will this take:
Milestone one:	
Target date (set by tutor):	
Milestone two:	
Target date (set by tutor):	
Comments and agreement from tutor	
Comments (optional): I confirm that the project is not work that has been or will be submitted for another qualification and is appropriate: Agreed: (name) (date)	
Comments and agreement from project proposal checker (if applicable)	
Comments (optional): I confirm that the project is not work that has been or will be submitted for another qualification and is appropriate: Agreed: (name) (date)	

What is Self-Evaluation?

Self-evaluation (also known as 'reflective practice') is a means of analysing something you have done or have been involved with. This could be an individual task or a series of tasks completed over a period of time. The purpose of self-evaluation is to look back at an event after a short period of time to analyse, evaluate and explore if the event could be made better. It may be that the undertaking cannot be improved, in which case you are confirming best practice through your reflection. Self-evaluation is generally accepted as being an essential part of an engineer's professional development

Self-evaluation could be applied to every task that is performed, and on some occasions this may be the right thing to do, however; repeatedly documenting the same thing over and over without any changes in outcome is of little benefit or purpose.

Setting aside time to reflect will be of most use to you if it is undertaken regularly, at a time that fits in easily to your lifestyle. It is essential that it is in a format that makes sense to you. What evolves from your reflection are your views, so there is no right or wrong way of doing it.

You will need to reflect not only on how successfully you have executed your proposal, but also on your own performance at several points throughout the project; a good time to do this would be after each milestone has been reached and when the project has been completed. Effective self-reflection can help to identify further continuing professional development and assist in the formation of a personal training development plan.

Self-Evaluation Form Template

Student Team	
Student Name	Student Number

Date _____

Centre Name _____
Tutor _____
Project Title _____

Section One: Outline the experience/task you are reflecting upon
Section Two: Detail the steps that were undertaken explaining why you took them
Section Three: What went well?
Section Four: What could have been done better? How could this have been achieved?

Section 5: Has anything been changed or improved as a result of your undertakings?

Assessment Criteria

Learning Outcomes and Assessment Criteria		
Pass	**Merit**	**Distinction**
LO1 Evaluate the risk evaluation theories and practices associated with the management of projects for the production of current and developing technology		
P1 Evaluate the risk evaluation theories and practices associated with the management of engineering projects. **P2** Assess elements and issues that impact the successful management of engineering activities.	**M1** Critically evaluate the main elements and issues that impact the successful management of engineering activities.	**D1** Specify and analyse the challenges encountered when meeting the requirements for successfully managing engineering activities, and make justified recommendations to overcome these challenges.
LO2 Produce an engineering services delivery plan that meets the requirements of a sector-specific organisation		
P3 Develop an engineering services delivery plan, applying the appropriate sector-specific requirements **P4** Determine the engineering management tools needed for designing an engineering services delivery plan.	**M2** Evaluate how each step of the delivery plan developed meets the requirements of a sector specific organisation.	**D2** Critically evaluate contingencies that might prevent the delivery plan meeting the requirements of a sector-specific organisation.
LO3 Develop effective leadership, individual and group communication skills		
P5 Describe the steps for effective persuasion and negotiation.	**M3** Evaluate leadership styles and effective communication skills using specific examples in an organisational context.	**D3** Critically evaluate effective ways for the coaching and mentoring of disillusioned

Learning Outcomes and Assessment Criteria		
Pass	**Merit**	**Distinction**
P6 Explain the steps for managing effective group meetings. **P7** Outline the steps to deliver an effective presentation.		colleagues or of a poorly performing team.
LO4 Develop personal commitment to professional standards and obligations to society, the engineering profession and the environment		**D4** Evaluate and provide justifications on why it is necessary to be active and up to date with the engineering profession's new developments and discoveries.
P8 Discuss the context of social responsibility for scientists and engineers. **P9** Explore the ways in which an engineer can engage in continuing professional development.	**M4** Summarise the engineering profession ethical standards and patterns of behaviour.	