

BTEC

HIGHER NATIONALS

Engineering

**Higher National
Diploma Lvl 5**

 **Pearson**

Unit 34: Research Project

Unit code	J/615/1502
Unit type	Core
Unit level	5
Credit value	30

Introduction

Completing a piece of research is an opportunity for students to showcase their intellect and talents. It integrates knowledge with different skills and abilities that may not have been assessed previously, which may include seeking out and reviewing original research papers, designing their own experimental work, solving problems as they arise, managing time, finding new ways of analysing and presenting data, and writing an extensive report. Research can always be a challenge but one that can be immensely fulfilling, an experience that goes beyond a mark or a grade, but extends into long-lasting areas of personal and professional development.

This unit introduces students to the skills necessary to deliver a complex, independently conducted research project that fits within an engineering context.

On successful completion of this unit students will be able to deliver a complex and independent research project in line with the original objectives, explain the critical thinking skills associated with solving engineering problems, consider multiple perspectives in reaching a balanced and justifiable conclusion, and communicate effectively a research project's outcome. Therefore, students develop skills such as critical thinking, analysis, reasoning, interpretation, decision-making, information literacy, information and communication technology literacy, innovation, conflict resolution, creativity, collaboration, adaptability and written and oral communication.

Learning Outcomes

By the end of this unit students will be able to:

1. Conduct the preliminary stages involved in the creation of an engineering research project.
2. Examine the analytical techniques used to work on all stages of the project and strategies required to overcome the challenges involved in a research project.
3. Reflect on the impact the research experience could have in enhancing personal or group performance within an engineering context.
4. Explore the communication approach used for the preparation and presentation of the research project's outcomes.

Essential Content

LO1 **Conduct the preliminary stages involved in the creation of an engineering research project**

Setting up the research preliminaries:

Project proposal

Developing a research question(s)

Selection of project approach

Identification of project supervisor

Estimation of resource requirements, including possible sources of funding

Identification of project key objectives, goals and rationale

Development of project specification

LO2 **Examine the analytical techniques used to work on all stages of the project and strategies required to overcome the challenges involved in a research project**

Investigative skills and project strategies:

Selecting the method(s) of collecting data

Data analysis and interpreting findings

Literature review

Engaging with technical literature

Technical depth

Multi-perspectives analysis

Independent thinking

Statement of resources required for project completion

Potential risk issues, including health and safety, environmental and commercial

Project management and key milestones

LO3 Reflect on the impact the research experience could have in enhancing personal or group performance within an engineering context

Research purpose:

Detailed statement of project aims

Relevance of the research

Benefits and beneficiaries of the research

LO4 Explore the communication approach used for the preparation and presentation of the research project's outcomes

Reporting the research:

Project written presentation

Preparation of a final project report

Writing research report

Project oral presentation such as using short presentation to discuss the work and conclusions

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Conduct the preliminary stages involved in the creation of an engineering research project		D1 Produce a comprehensive project proposal that evaluates and justifies the rationale for the research
<p>P1 Produce a research project proposal that clearly defines a research question or hypothesis</p> <p>P2 Discuss the key project objectives, the resulting goals and rationale</p>	M1 Analyse the project specification and identify any project risks	
LO2 Examine the analytical techniques used to work on all stages of the project and strategies required to overcome the challenges involved in a research project		D2 Critically analyse literature sources utilised, data analysis conducted and strategies to deal with challenges
<p>P3 Conduct a literature review of published material, either in hard copy or electronically, that is relevant to your research project</p> <p>P4 Examine appropriate research methods and approaches to primary and secondary research</p>	<p>M2 Analyse the strategies used to overcome the challenges involved in the literature review stage</p> <p>M3 Discuss merits, limitations and pitfalls of approaches to data collection and analysis</p>	

Pass	Merit	Distinction
L03 Reflect on the impact the research experience could have in enhancing personal or group performance within an engineering context		D3 Critically evaluate how the research experience enhances personal or group performance within an engineering context
P5 Reflect on the effectiveness and the impact the experience has had upon enhancing personal or group performance	M4 Evaluate the benefits from the findings of the research conducted	
L04 Explore the communications approach used for the preparation and presentation of the research project's outcomes		D4 Critically reflect how the audience for whom the research was conducted influenced the communication approach used for the preparation and presentation of the research project's outcomes
<p>P6 Explore the different types of communications approaches that can be used to present the research outcomes</p> <p>P7 Communicate research outcomes in an appropriate manner for the intended audience</p>	M5 Evaluate how the communication approach meets research project outcomes and objectives	

Recommended Resources

Textbooks

LEONG, E.C., LEE-HSIA, C.H. and WEE ONG, K.K. (2015) *Guide to Research Projects for Engineering Students: Planning, Writing and Presenting*. Apple Academic Press Inc.

OBERLENDER, G.D. (2014) *Project Management for Engineering and Construction*. 3rd Ed. McGraw-Hill Education.

Websites

<https://www.apm.org.uk/> Association for Project Management
(General Reference)