

School of Electronic and Electrical Engineering



UNIVERSITY OF LEEDS

Module title: MEng Individual Project

Module code: **ELEC5870M**

Start date: October 2023

45 credits

Module Handbook¹

All you need to know about this module

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¹ Consolidating legacy guidelines/documents from ELEC3875, ELEC5870M and inspired by MECH3890 module Handbook.

Contents

| | |
|---|----|
| 1. Introduction to the Module | 3 |
| 1.1 What is ELEC5870M & how does the module operate? | 3 |
| 1.2 Project time schedule | 5 |
| 1.3 Methods of teaching and assessment | 6 |
| 2. Objectives and learning outcomes..... | 7 |
| 2.1 Module objectives..... | 7 |
| 2.2 Module Learning Outcomes..... | 8 |
| 3. Phase I: Project finding and project proposal | 8 |
| 3.1. How to get your Project and Project Supervisor..... | 8 |
| 3.2. Project proposal (scoping and planning) | 9 |
| 4. Phase II: Interim progress report | 12 |
| 4.1 Interim Progress report..... | 12 |
| 4.2 Style, Formatting and Referencing..... | 13 |
| 4.3 Plagiarism | 14 |
| 5. Phase III: Finishing the project, final submissions and oral presentation..... | 15 |
| 5.1 Project Exhibition | 15 |
| 5.2 Final report contents..... | 15 |
| 5.3 Presentation and oral examination (project viva) | 17 |
| 6. Additional information..... | 18 |
| Appendix 1: Useful documents and forms..... | 19 |

1. Introduction to the Module

Welcome to ELEC5870M, MEng Individual Project. This section gives you a brief overview of the module and how you can navigate the module's Minerva page for the resources you need. On the webpage, there are many tabs for you to find useful information about the module. The Module Information tab contains most of the important information about the module and how it is run. This module handbook gathers almost all of such information and provides useful links for you to know what you are expected to do and when.

1.1 What is ELEC5870M & how does the module operate?

The MEng Individual Project is a 45-credit module taken by all students on the School's programmes leading to a MEng Honours degree. It is the most important module you will take on your degree programme, and your project has a major influence on your degree classification.

For many students, this major project is the most satisfying and enjoyable module on the entire course. It can also be the most challenging ... usually there are no unique solutions, meaning that you will have to make your own decisions as to the methods you employ. The project provides an opportunity to prove that you are ready to be considered a professional engineer, able to manage a complex technical project, write a high-quality formal report, and achieve something to be proud of. Prospective employers will often ask about your 'final year project', and you can mention your project achievements on your CV.

ELEC5870M projects are **conducted individually**, and **assessed individually**. Many of the School's teaching staff are involved in ELEC5870M by supervising and assessing projects. The Module Leader for ELEC5870M also acts as the projects' coordinator, overseeing the allocation of projects, resources, and the assessment process.

Projects may be undertaken across a wide range of topics within the disciplines represented by the School's programmes of study. Ideally, your project topic should be appropriate to any special emphasis of your particular degree programme. For example, if you are studying on the Electronics and Communications Engineering programme, you should ideally undertake a project that is relevant to the communications theme. However, there is considerable scope within this to choose from a

wide variety of topics (for example, Digital Communications, DSP, RF and Microwaves, Optoelectronics, etc).

Why your project is so important?

The project module is an essential part of your degree programme. You **MUST pass your project** in order **to graduate**, and since ELEC5870M is 45 credits, the mark you obtain will have the largest influence on your final degree classification.

Success in your project will depend on hard work, and on devoting the right amount of time. You should bear in mind that, as a 45-credit module, ELEC5870M represents almost a **half of your total study time for the year**.

ELEC5870M runs over both semesters. However, the workload is split approximately one-third in Semester One and two-thirds in Semester Two. In the first semester, you are expected to engage in project planning, understanding underlying theory and the project aims, identify, read and understand relevant background literature, undertake preliminary design work (simulations), order any specialist parts, etc. You are expected to conduct most of your practical work in the second semester, when you will have more time to focus on your project. Where projects require allocated laboratory space, this will only be available in the second semester.

You will have an academic Supervisor from whom you will receive regular guidance and support. However, your Supervisor will not do the work for you! This will be your project. You should keep records of all your meetings with your Supervisor in a Log Book. You will also need to maintain an on-line journal of your progress, and this forms part of the assessment. You will be allocated an Assessor from among the academic staff within the School. Both your Supervisor and Assessor will be involved in determining the marks for your project.

The main assessment is conducted towards the end of the academic year. However, an initial assessment (worth 25% of the total marks) is carried out at the end of the first semester. You will need to write an interim report about your progress and remaining steps of the project and submit it by the end of week 12. It will be assessed by your Supervisor and Assessor to provide you some feedback.

The final assessment process includes a written final report, a qualitative assessment of your progress and commitment (throughout the project period), and an oral examination. The final report, worth **75%** of the module marks, will be submitted in Week 25. **10%** of the module marks is devoted to your conduct throughout the project. Finally, you need to attend a viva session run by your Supervisor and Assessor in Weeks 25/26/27.

1.2 Project time schedule

The main activities/deadlines regarding the module have been outlined in the time schedule below:

Table I: Details of activities/deadlines for 23/24(3) ELEC5870M

| Week | Activity/Deadline |
|----------------|--|
| Weeks 1-3 | Finding and proposing a project, deadline: 20 Oct. 2023, 4:30PM, Minerva submission. |
| Week 4 | Your first blog post on project description, deadline: Sunday, 29 Oct 2023, 11:59PM; see Progress Journal on Minerva. |
| Weeks 5-6 | Weekly reports, deadline: Sundays at 11:59PM; see Progress Journal on Minerva. |
| Week 7 | Post on initial time plan, deadline: Sunday, 19 Nov 2023, 11:59PM; see Progress Journal on Minerva. |
| Weeks 8-11 | Weekly reports, deadline: Sundays at 11:59PM; see Progress Journal on Minerva. |
| Week 12 | Interim report submission, deadline Friday, 19 January 2024. |
| Week 14 | Post on Additional progress during the break, deadline: Sunday, 4 February 2024, 11:59PM; see Progress Journal on Minerva. |
| Weeks 15-16 | Weekly reports, deadline: Sundays at 11:59PM; see Progress Reports on the VLE. |
| Week 17 | Post on Final Gantt Chart, deadline: Sunday, 25 Feb 2024, at 11:59PM; see Progress Journal on Minerva. |
| Weeks 18-21 | Weekly reports, deadline: Sundays at 11:59PM; see Progress Journal on Minerva. |
| Weeks 22-23 | Working on your final report; consulting with your supervisor |
| Week 25 | Final report submission, deadline: Tuesday, 14 May 2024, 11:59PM. |
| Weeks 25-27 | Poster session on Wednesday, 15 May 2024. Viva exams |

During the first phase, the module leader will lead all the teaching activities. There will be an introductory Q/A lecture in Week 2. There will also be another Q/A lecture in Week 20. The format of these Q/A lectures are highly likely to be in person. But if hybrid becomes a possibility (you will receive an announcement if so), you can also join these lectures remotely. If this happens, you will need the MS-Teams application installed on your PC.

A MS Class Team would then be created for the module that you will find once logged into MS Team application. The virtual classroom would be called 23/24(3) ELEC5870M MEng Individual Project.

1.3 Methods of teaching and assessment

Assessments of different forms will be carried out to make sure that the learning outcomes are achieved. Full guidance on assessment criteria is provided in Rubric files. The table below shows the breakdown of summative assessment for 23/24(3) ELEC5870M. Note that students will also receive feedback on their progress during meetings with their academic supervisor.

Table II: Breakdown of Assessment for 23/24(3) ELEC5870M

| Assessment type | Notes | % of total mark |
|-------------------|--|-----------------|
| Project | Project commitment and independence | 10 |
| Presentation | Public exhibition | 10 |
| Oral presentation | Viva examination of technical achievements and understanding | 30 |
| Report | Interim report | 20 |
| Report | Final report | 30 |
| Total | | 100 |

Resits for ELEC and XJEL modules are subject to the School's Resit Policy and the Code of Practice on Assessment (CoPA), which are available on Minerva.

The table below shows the breakdown of total hours you are expected to spend on this module:

Table III: Breakdown of learning hours for 23/24(3) ELEC5870M

| Delivery type | Number | Length hours | Student hours |
|------------------------------------|--------|--------------|---------------|
| On-line Learning | 4 | 1.00 | 4.00 |
| Private study hours | | | 446.00 |
| Total Contact hours | | | 4.00 |
| Total hours (100hr per 10 credits) | | | 450.00 |

In addition to the Q/A lectures, students will also have meetings with an academic (staff) Supervisor. It is expected that there will be an opportunity for students to meet their supervisor an average of once per week or two weeks, for the duration of the project (term weeks). However, the precise format and frequency of these meetings will be arranged between the supervisor and the student.

You must plan to set aside approximately 15 hours per week from week 4 until week 24 (including 8 weeks of Christmas and Easter break) to complete the project—450 hours of work in: $24 - 3 + 8 = 29$ weeks; $450/29 = 15.5$ hrs/week.

2. Objectives and learning outcomes

2.1 Module objectives

The MEng Individual Project is a major independent technical project. Students are required to investigate and define a technical problem, and develop a solution by employing the knowledge and skills gained in previous years of study. Students work under the supervision of an academic specialist from whom they receive regular guidance and support. At the conclusion of the module, the student should have gained significantly in self-confidence in the context of a technical project; verbal and written communication skills should have developed, and technical knowledge in some area should have been expanded.

2.2 Module Learning Outcomes

On completion of this module students should be able to:

MLO1 Define a complex technical problem, experimental investigation or design objective and propose a feasible plan of work to research and/or develop an appropriate solution within the constraints of time and resources available.

MLO2 Apply project management skills including time planning, working to deadlines and producing deliverables.

MLO3 Demonstrate creativity, innovation and technical competence by implementing the project proposal, delivering the problem solving, experimental investigation or design work specified in the plan, and reach substantiated conclusions derived from the work undertaken.

MLO4 Manage technical uncertainty, analyse scenarios and identify realistic options.

MLO5 Select and critically evaluate technical literature and other sources of information.

MLO6 Communicate effectively both the results of their own work and other complex information, with specialist and non-specialist audiences, selecting and evaluating the methods used.

MLO7 Reflect on progress and the extent of independent self-learning and development, through undertaking a substantial technical project.

3. Phase I: Project finding and project proposal

3.1. How to get your Project and Project Supervisor

The project search process begins in Week 1. Between Week 1 and Week 3, the process of project allocation takes place. You should go through the technical profile of the academic staff and projects offered and decide which ones interest you.

The project allocation process starts by each potential supervisor advertising a list of projects he/she is proposing for project students to work on. Essentially, every supervisor will have a list of available projects with the title and description of the project. All projects from all supervisors are compiled into one document, which is made available on Minerva by the end of Week 1. Take time to read through it carefully; it will give you ideas, and help you to select one of the projects of interest to you. You should then contact your potential project supervisor(s) to discuss taking a project, or perhaps

some related project that you thought about, which is in the area of interest of a particular supervisor.

If, for whatever reason, you do not have a project by the end of Week 3, a Project Supervisor will be allocated for you. However, this does mean that you may not get a project topic that really interests you, although we make every effort to avoid this situation.

3.2. Project proposal (scoping and planning)

In Week 4 you will have a Project Supervisor and a general idea of what your project topic will be. Before you can begin your project, you need to think carefully about what you are going to do. If you are too ambitious, you may not be able to achieve what you set out to do. However, if your objectives are too easy, your project may be deemed unworthy of a Level 5 Project (and you would probably feel unsatisfied with your achievement anyway!). Perhaps the worst situation would be to have no firm plan at all... in that case you are likely to drift and achieve very little. For all these reasons, proper planning is a vital part of managing your project. Your Supervisor may well have suggested some ideas for the project — an outline plan or proposal. But it is up to you to plan the details, and to manage your time and be clear about what you can achieve.

The Project Proposal Form (Questionnaire) is where you show your understanding of the problem and wider context, the aim of the project and objectives, milestones, resources needed and risks involved. You should complete this form, to clearly answer these questions:

1. A brief description of the project.
2. What resources you might require for your project?
3. Health and safety aspects of your project work.
4. Ethical review, and are you addressing societal factors such as inclusivity and sustainability in your project?

Societal impacts

As pointed out in the “The Accreditation of Higher Education Programmes (AHEP)” document: Engineers must operate in a responsible and ethical manner as engineering activities normally have significant societal impacts. A responsible engineer must appreciate the importance of diversity and try to ensure the benefits of innovation and progress are shared equitably and do not compromise

the natural environment or deplete natural resources to the detriment of future generations. This section of the proposal form is devoted to different societal factors and you need to explain the measures you are taking to address each. If a factor is not applicable to your project, you need to justify this in the corresponding textbox in the proposal form.

Sustainability: Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts. To this end, you can refer to the life-cycle of products or processes involved in your project.

Ethics: If applicable, you need to identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct. Otherwise, you need to explain why this is not applicable to your work. For this part, you can refer to the Ethics lectures you have had throughout your degree in different Modules.

Risk: You are expected to demonstrate your risk management capability which needs you to identify, evaluate and mitigate risks (the effects of uncertainty) associated with your project and its activities.

Equality, diversity and inclusivity: You need to adopt an inclusive approach to all engineering practices, and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion. You need to explain if you have considered these aspects and how you are planning to address them in your project.

Safety: We take safety in our laboratories very seriously. The University's safety ethos is that *everyone* has a responsibility for safety. This means that although the staff within the School have safety responsibilities (for example, conducting Risk Assessments) you also have a responsibility for your own safety.

Managing your own safety is also part of project planning. For most projects, where work is carried out in the School's main laboratories (B55a, 160, 261) it is sufficient to be familiar with the projects Safety Policy document. This document is the *Risk Assessment* for project work, and it is available on Minerva. The main points arising from the Risk Assessment are also covered in the safety briefing which is included in the introductory lecture for the module. If you did not attend the safety briefing you will not be permitted to commence your project until we are satisfied that you are aware of all relevant safety policies.

If your project will include work in laboratory areas other than the School's main laboratories (e.g. a specialist research laboratory, or B55b) then you must read the relevant Risk Assessment for that laboratory. You must also receive full instruction (from someone properly authorised to give such instruction) for the use of any equipment you need in a specialist research laboratory. It is your responsibility to make sure that you comply with this policy.

In some rare cases, your project work might involve activities that are not covered by an existing Risk Assessment. If that applies to your project then **IT IS ESSENTIAL** that your **Supervisor** completes a Risk Assessment Form. A copy of the completed Risk Assessment Form must be submitted to the Module Leader **before any project work commences**.

To help you fulfil your responsibility for safety, the Project Proposal Form includes a check-list for the level of safety preparation you are likely to need. It also requires you to sign a declaration, confirming that you have attended the safety briefing.

4. Phase II: Interim progress report

4.1 Interim Progress report

The following guidelines relate to the Interim Progress Report, which is required for ELEC5870M.

The suggested word-count for your Interim Progress Report is 3,000 words. This is an approximate figure and you should aim to write between 2,000 and 4,000 words.

Your report should be properly word-processed and include the following:

- A short summary of your project objectives
- An Introduction to the technical background and motivation for your project
- A summary of the background literature you have read/found to be helpful.
- A description of the work done during the first term
- A reflection on your progress and any project management issues
- A description of your plans for the next semester

The introduction should provide the necessary background information for the reader, particularly your Assessor, who may not be familiar with the details of your project. Explain the general context of what you are seeking to do. The introduction is not a 'repeat' of your project objectives. Rather, it is an opportunity to explain why your chosen project topic is worth investigating, what the current 'state of the art' might be, what the possible applications might be, what the relevant technical issues are, etc.

Every serious piece of technical project work will involve reading some background literature. You should briefly describe the reading you have done, and discuss the literature that you found to be relevant and helpful. You may discuss background literature in a separate section, or it may form part of your introduction and the other sections of your report – this is up to you.

The description of the work done during the first term should be concise, but contain enough technical details so that your Supervisor and Assessor can form a proper impression of what has been achieved. This is the most important section in your report because it indicates not only how much you have done, but how much technical depth there has been to your work.

The last two sections are also very important. You have worked on your project for much of the first term. You need to be realistic about your own progress, and provide an honest self-appraisal. You should then say what you are planning to do in the next semester and include some specific technical details. Be as specific as you can about your intentions for the next semester. Use a Gantt chart if you wish, or any other means, to state clearly what progress has been made and what your plan is for Semester Two.

Remember, your Interim Report has a particularly important role for your Assessor, who may not be an expert in the topic of your project. Your Interim Report should be written with this in mind, i.e. do not assume that your Assessor will know what your project is all about! The purpose of your report is to explain and inform.

It is worth considering the meaning of two key metrics here: 'Critical Analysis' and 'Synthesis'. Critical analysis means that you have not simply described your technical work, but that you have also applied a well-reasoned case for your interpretations/comparisons/actions/decisions, etc. For example, if you write "a MOSFET transistor was chosen", this is descriptive. However, if you write "a MOSFET transistor was chosen because..." (and then present a reasoned argument for your choice) then you have engaged in critical analysis. You might also have found alternative approaches which use a different type of transistor. You can then explain (justify) why your decision to use a MOSFET is more appropriate.

A deeper level of technical engagement arises when you begin to combine your analytical work to develop or propose solutions for your particular project objectives. This is known as synthesis. To obtain high marks, you will need to demonstrate both critical analysis and synthesis in the technical content of your project work.

4.2 Style, Formatting and Referencing

You will find a supplementary document on Minerva entitled 'Writing Technical Reports'. This provides plenty of advice on good practice as far as writing style, structure and formatting are concerned. There is also a further guide to the IEEE referencing conventions. You should consult these documents as you produce your report – they have been provided to help you improve the quality of your technical writing. The names of these files-guides have been provided in Appendix 1.

4.3 Plagiarism

The University has a formal definition of plagiarism which is worth bearing in mind: 'Plagiarism is defined as presenting someone else's work as your own. Work means any intellectual output, and typically includes text, computer code, images, etc.'

To avoid inadvertent plagiarism, it is important to be rigorous in your application of the following: If you refer to ideas (theory, equations, circuit topologies, background information, etc) that you did not devise, derive, formulate or research yourself, but instead found in a book, journal, website, etc, then you should state the source. To do otherwise would be to attempt to pass off the ideas as your own. The only exception to this rule is for very well known and established ideas, theory, etc, which are essentially 'common knowledge' in the context of our discipline. For example, you do not need to refer to a source for Ohm's Law. However, if you are in any doubt, state the source. If you quote something verbatim (i.e. exactly as you found it in a book, journal, website, etc) then you must not only state the source, but you should place quotation marks around the text in question. Diagrams reproduced exactly from external sources must also be clearly acknowledged as such (use 'reproduced from...' in your caption below the image). If you simply base your own diagram/image on a similar diagram in an external source, then a standard reference is all that is required.

You should note, however, that if your work consists largely of direct quotations from other sources, you are at risk of submitting something which is still, essentially, the work of others (even if correctly acknowledged). Whilst not constituting plagiarism, a submission like this is unlikely to be awarded a very good mark! Remember... you are required to produce a report that is worthy of a serious piece of academic work.

Also, you should be aware of the University's rules on collusion and academic malpractice. Your submitted work must also be entirely your own. You are entitled to have feedback from your Supervisor and to make use of resources designed to help with written English. However, you are not permitted to engage the services of, or obtain help from, any third party to help proof-read, correct or edit your work.

5. Phase III: Finishing the project, final submissions and oral presentation

This is the final phase of the project module. You need to submit your final report in Week 25. There will be an oral exam carried out within Weeks 25/26/27 in which you present your project and answer questions asked by your Supervisor and Assessor. Except for that, there is also a projects poster exhibition, in the School Foyer, in week 25, where all staff members and students can look at your poster, in which you have presented your work and results, ask you some questions and discuss with you various aspects of the project. This is also marked by the Supervisor and Assessor.

5.1 Project Exhibition

To attend the project exhibition you should bring the poster printed on paper, A1 size (portrait or landscape, the poster should just be printed, and does not have to be laminated), put it on the poster boards in the School Foyer (reception area of the School of E&EE), which will be provided in the reception area on that day. If your project was practical / experimental you can also bring the equipment (devices, systems) that you have made / used for your project work.

5.2 Final report contents

This guideline relates to the Final Report, which is required for ELEC5870M. The suggested word-count for your Final Report is **broadly around 10,000 words**. This is an approximate figure, the word count could be different depending on the project nature.

The Final Report should be a comprehensive, high quality document that does justice to the substantial piece of work your project represents. It should be written carefully and presented in a professional manner, properly word-processed and formatted. There is a standard structure you should use for the report, as follows:

| |
|---|
| • Cover Page |
| • Declaration of Academic Integrity |
| • Abstract |
| • Acknowledgements |
| • Contents Page (followed by lists of figures, tables, symbols) |
| • Introduction |
| • Chapters (describing the work and results) |
| • Conclusions |
| • References and Bibliography |
| • Appendices (if necessary) |

- The first section relates to formal requirements for the module (ELEC5870M).
- The abstract and acknowledgements should be located before the contents page (and do not need page numbers).
- The section in yellow is the main section of your report.
- Appendices may be included if required, although this section is not absolutely essential.

As with your Interim Progress Report, the introduction should provide the necessary background information for the reader. You should certainly include your project objectives, but again, remember that the introduction is much more than this. It is an opportunity to explain why your chosen project topic is worth investigating, what the current 'state of the art' might be, what the possible applications might be, what the relevant technical issues are, etc.

The description of the work done during the project should be comprehensive. This is the most important section in your report because it indicates not only how much you have done, but how much technical depth there has been in your work. Bear in mind that the assessment scheme for the module has elements for critical analysis and synthesis.

Your conclusion should also include a brief reflection on what you have learnt from undertaking your project as far as project management is concerned.

Style, Formatting and Referencing: You should refer to the 'Writing Technical Reports' document for a reminder of the guidance on writing style and correct referencing. This provides plenty of advice on good practice as far as writing style, structure and formatting are concerned. There is also a further guide to the IEEE referencing conventions. You should consult these documents as you produce your report – they have been provided to help you improve the quality of your technical writing.

Re-using material from your Interim Progress Report: It is acceptable to re-use introductory material from your Interim Progress Report if you wish, although clearly your Final Report will be a much more comprehensive document. However, you should consider how you can improve on any introductory material from your previous report, rather than simply re-use it.

Backup Copies: You are responsible to keep adequate backup copies of all your work, including reports. The School will not normally make allowances for work lost due to inadequate management of data files on your part. Hard disks and USB memory devices do occasionally fail, or you may have the misfortune to have a laptop stolen or perhaps misplace your USB storage device — whatever the reason, the School holds you responsible to take reasonable precautions against data loss.

Check List: Have you...

1. Downloaded and correctly completed the Cover Sheet?
2. Signed and included a copy of the Declaration of Academic Integrity?
3. Checked that your references are listed correctly?
4. Re-read your report, checking for typing mistakes/incomplete sentences?
5. Submitted an electronic copy via the Turnitin portal on the ELEC5870M on Minerva?

5.3 Presentation and oral examination (project viva)

The project viva can take place any day during weeks 25/26/27 for a duration of around one hour. Normally, your Supervisor will arrange this with your Assessor and then inform you about the date and time for your project viva. Let your Supervisor know if the agreed date does not work for you, if you have convincing reasons. You should make sure that you attend the oral exam on the date and time agreed upon using the online tool that works for all of the attendees (Microsoft Teams is recommended).

On the day of viva, you need to attend the oral exam using the link provided to you. You must be prepared to turn on your camera for the whole duration of the exam. You may wish to share your screen to present your presentation slides and go over them in a maximum of 20 minutes.

Do not forget to add slide numbers in your presentation, so that your audiences can refer back to the right slide while asking questions at the end. Every presentation is unique but it is better not to exceed showing 1 slide per minute so that you can manage to explain contents adequately.

Remember not to cram too much information on each slide. You are encouraged to use 7×7 rule for

designing your slides, based on which you are to use no more than 7 lines of text/bullet points per slide, and no more than 7 words in each line (google the term for more information).

Following your presentation, your Supervisor and Assessor will follow up with a series of questions to assess your project and examine your understanding of the work and technical competence.

6. Additional information

The [taught student guidance webpages](#) provide useful information for students on taught courses at the University of Leeds, introducing University services and possible sources of help. It also sets out the Regulations and Codes of Practice which apply to students.

Appendix 1: Useful documents and forms

This Appendix points to the forms and guidelines you will most likely need for your project. All these can be accessed on the Module Minerva page.

- Forms and front pages you need to include in your reports, which include
 - 1. Project proposal form
 - 2. Declaration of Academic Integrity
 - 3. Interim report front cover
 - 4. Final report front cover

- Manufacturing and purchasing request:
 - 1. Guidelines on requesting the manufacturing of parts for your project
 - 2. Guidelines on requesting purchasing of parts for your project

- How to keep your progress journal

- Writing and formatting guidelines:
 - 1. Writing Technical Reports
 - 2. IEEE Referencing Style

Marking rubric - Interim report (20% of the overall mark)²

| Criteria | Class (Levels of Achievement) | | | | |
|---|---|---|---|--|--|
| | Fail (Quite Insufficient): 0%-39.9% | Marginal Fail (Insufficient): 40%-49.4% | Lower Second (Good): 49.5% – 58.9% | Upper Second (Very good): 59% – 68.4% | First (Excellent): 68.5% – 100% |
| Clarity of objectives (including background & motivation) and Technical content (of preliminary work and proposals for remainder of project) (50%) | No useful explanation of background, motivation or project objectives. No meaningful description of preliminary or planned work. | Background motivation and objectives are not explained. Only basic preliminary and planned work are described, with no critical analysis or plans for the next step. | Background motivation and objectives are all discussed. Some reasonable preliminary and planned technical work are described, with some critical analysis applied. | Background motivation and objectives are all clearly discussed. Comprehensive preliminary and planned technical work are described, with good critical analysis and synthesis demonstrated. | Background motivation and objectives are all explained with clarity and accuracy. Very comprehensive and competent preliminary and planned technical work are described, with excellent critical analysis and synthesis demonstrated. |
| Quality of presentation, Structure, Clarity of Writing and Referencing (50%) | Very poor presentation and organisation. Incoherent writing. Negligible referencing. | Poor presentation and organisation. Unclear descriptions of the work. Limited and poor referencing. | Well-presented and clearly organised. Descriptions are generally clear. Appropriate references, most are listed correctly, in accordance with IEEE convention. | Very well presented and logically organised. Clearly written, and a good range of well-chosen references, listed correctly, in accordance with IEEE convention. | Outstanding presentation, organisation and clarity. Excellent choice and range of references, appropriately cited, and listed correctly, in accordance with IEEE convention. |

² Your submitted written work must meet a minimum English competency level. Please ensure that you use paragraphs and that there are links between and within paragraphs. Please ensure that your word choice and grammar do not undermine the meaning and comprehensibility of your argument and that your word choice and grammar are appropriate for an academic text. You should also correctly reference any external sources that you have used.

If you fail to meet this threshold level, your work may not be assessed. In addition, you will be referred to the Language Centre for English language support to improve your academic writing for future assessments.

Marking rubric – Professional conduct (2 X 5% of the overall mark)

| Criteria | Class (Levels of Achievement) | | | | |
|--|--|--|---|---|--|
| | Fail (Quite Insufficient): 0%-39.9% | Marginal Fail (Insufficient): 40%-49.4% | Lower Second (Good): 49.5% – 58.9% | Upper Second (Very good): 59% – 68.4% | First (Excellent): 68.5% – 100% |
| Engagement (40%) | Very low engagement with the project, with quite poor to no attendance at the meetings. No project management skills shown. | Little engagement with the project, with poor attendance at the meetings. Insufficient project management skills shown. | A good attitude and commitment towards the project demonstrated by good project engagement and attendance at the meetings. Applying project management skills (time planning, working to deadlines and producing deliverables) to a good extent. | A very good level of commitment towards the project and attendance at project meetings. Finding and making use of some scholarly reviews and primary sources appropriate to the discipline. Applying project management skills (time planning, working to deadlines and producing deliverables) to a very good extent. | An excellent level of commitment towards the project and attendance at project meetings. Finding and making use of several scholarly reviews and primary sources appropriate to the discipline. Applying project management skills (time planning, working to deadlines and producing deliverables) to an excellent extent. |
| Level of initiative shown (30%) | Little driving attitude with poor engagement with the supervisor, and no initiative shown. | Insufficient driving attitude with poor engagement with the supervisor, and little initiative shown. | A good level of initiative towards the project activities, generally providing ideas to resolve challenges. | High level of initiative and responsibility towards project activities. Production of effective ideas that lead to an efficient project progression. | Continuous pro-active initiative and responsibility. Steady production of original ideas leading to an efficient project progression. Showing the ability to manage their own learning. |
| Online portfolio (30%) | Numerous entries missing with content poorly organised. Little to no contribution to recording meetings. | Insufficient record of work. Occasional contribution to recording meetings. | Regular entries; mostly substantial and reasonably well organised. Good contribution to recording meetings. | Consistently substantial entries, which are very well organised. Very useful contribution to recording meetings and planning future steps. | Comprehensive record, intelligent note-taking, excellent organisation. Significant contribution to recording meetings and planning future steps. |

Project report and oral examination (70% of the overall mark)³

| Criteria | Class (Levels of Achievement) | | | | |
|--|--|---|--|--|--|
| | Fail (Quite Insufficient): 0%-39.9% | Marginal Fail (Insufficient): 40%-49.4% | Lower Second (Good): 49.5% – 58.9% | Upper Second (Very good): 59% – 68.4% | First (Excellent): 68.5% – 100% |
| Overall technical achievement as evidenced by the report and viva (20%) | Very little technical achievement presented. technical work falls well short of expectations; module learning outcomes have not been met. Project aim and objectives not achieved. | Some progress with the project and some technical work delivered, but falling short of the standard required to meet the module learning outcomes. Project aim and objectives not achieved. | Arguments, assumptions, abstract concepts well evaluated to make judgements and achieve a good solution. Project aim and most objectives originally set out for the project achieved to a good extent. | Arguments, assumptions, abstract concepts and data critically evaluated, to make judgements and frame appropriate questions; to achieve a good solution implement a functioning prototype. Project aim and all objectives achieved to a very good extent. | Arguments, assumptions, abstract concepts and data critically evaluated, to make judgements and frame appropriate questions – some of which at the forefront of discipline – to identify and implement a working solution, with some originality demonstrated. Project aim and all objectives originally set out for the project fully achieved. |
| Introduction of the report (10%) | Minimal explanation of background, motivation and project objectives. | Not enough explanation of background, motivation and project objectives. | Background, motivation and project objectives discussed to a good extent in sufficient depth, demonstrating good understanding of the wider context of the project. | Background, motivation and project objectives clearly discussed, demonstrating very good understanding of the wider context of the project and how the project fits into this context. | Background, motivation and objectives explained and discussed with utmost clarity and accuracy, demonstrating comprehensive understanding of the wider context of the project and how the project fits into this context. |
| Depth, coherency and completeness of the report's content (15%) | Project work very briefly described with little to no meaningful conclusions and/or links between different sections. | Project work briefly described with insufficient conclusions without adequate links between different sections. | Project work satisfactorily described (such that the reader can understand and reproduce most of the work). Sound content; meaningful links and good coherency between different sections; solid conclusions provided. | Project work comprehensively described (such that the reader can understand and reproduce the whole work). Sound content; meaningful links and very good coherency between different sections, solid conclusions provided and supported by data and results. | Project work comprehensively described (such that the reader can understand and reproduce the whole work). Sound content; excellent coherency between different sections, solid conclusions provided and supported by data and results. An understanding of the uncertainty, ambiguity and limitations of the techniques employed demonstrated. |
| Societal factors (5%) | Societal factors not addressed. | A few societal factors mentioned with no relevance or depth. | Some societal factors addressed to a good extent. | A variety of societal factors addressed very well where appropriate and relevant. | A variety of societal factors addressed in meaningful and practical ways where appropriate and relevant. |
| Report's presentational, editorial and writing style (10%) | Very poor presentation and organisation; Poor academic writing with little to no clarity. Very limited/insufficient referencing. | Poor presentation and organisation; Poor academic writing with minimal clarity. Limited/insufficient referencing. | Well-presented and organised. Clear and focused academic writing. Appropriate references used, most listed/cited correctly in accordance with IEEE conventions. Informative figures and tables of high quality. | Very well presented and logically organised. Clear, concise and focused academic writing. A good range of well-chosen references, listed correctly in accordance with IEEE conventions. A wide range of informative tables and figures of high quality. | Outstanding presentation, organisation and clarity. Clear, concise and focused academic writing backed up by evidence. Excellent choice and range of references, appropriately cited, and listed in accordance with IEEE conventions. A wide range of informative tables and figures of excellent quality. |
| Quality of viva's presentation & slides (10%) | A very poor level of organisation. Quite difficult to follow the presentation and find a reasonable storyline. | A poor level of organisation. Difficult to follow the presentation and find a reasonable storyline. | Sensible and tidy organisation of the slides. Content straightforward to understand. Important parts of the work presented in a concise and effective way. | Logically organised and neatly presented slides. The content thoughtfully composed and clearly presented. Good composition of text and figures with communicating the main work in a concise and effective way. | A professional presentation with exceptional confidence. Excellent organisation, with complex ideas presented in an enthusiastic and engaging manner. Excellent composition of text and figures, communicating the whole work in an optimal way. |

³ Your submitted written work must meet a minimum English competency level. Please ensure that you use paragraphs and that there are links between and within paragraphs. Please ensure that your word choice and grammar do not undermine the meaning and comprehensibility of your argument and that your word choice and grammar are appropriate for an academic text. You should also correctly reference any external sources that you have used.

If you fail to meet this threshold level, your work may not be assessed. In addition, you will be referred to the Language Centre for English language support to improve your academic writing for future assessments.

| | | | | | |
|--------------------------------------|--|---|---|---|--|
| Oral examination (15%) | Demonstrating very little understanding of the project topic. Communication shows quite limited clarity. | Demonstrating insufficient understanding of the project topic. Communication shows limited clarity. | Good knowledge and understanding of the project topic balanced towards the descriptive rather than critical or analytical; Good ability to communicate complex engineering matters, ideas, and answers to specialist audiences. | Demonstrating very good knowledge and understanding of the project topic as the student is able to relate facts/concepts together with some ability to apply to known contexts; Very good ability to communicate complex engineering matters, answers & ideas to specialist/non-specialist audiences. | Demonstrating excellent (or even exceptional) breadth and depth of knowledge and understanding of the project topic and being able to go beyond what has been discussed; Exceptional ability to communicate complex engineering matters, ideas, problems and answers to both specialist/non-specialist audiences demonstrating coherent, detailed and comprehensive knowledge. |
| Exhibition (poster) (15%) | Disorganised and untidy. Content is very unclear. | A basic level of organization, but generally untidy. Difficult to interpret in places. | Sensible and tidy organization of the poster. Content is straightforward to understand. | Logically organized and neatly presented. The content is thoughtfully composed and readily understandable. | A professional looking poster. Organisation is logical, and complex ideas are clearly presented. Excellent composition of text and figures. |