MSc Group Design Project

Student Handbook
2023-2024

Modules:

MECH0064: MSc Group Design Project

MECH0044: Evaluation and Planning of Business Opportunities in Bioprocessing and Life Sciences

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1 Modules Description

Module Code	MECH0044	MECH0064
Module Title	Evaluation and Planning of Business Opportunities in Bioprocessing and Life Sciences	MSc Group Design Project
MSc Programme	MSc Biomaterials & Tissue Engineering	MSc Mechanical Engineering MSc Power Systems Engineering
Structure	50% Group project + 50% individual coursework under BENG0008 module)*	Group Project (100%)

Level: **7**
Delivery: **Term 1 & 2**
Taught by: **Prof Suwan Jayasinghe** **(Module Coordinator)**
Academic Staff **(Supervisors)**
Credits: **15**

***Note**: For MECH0044 students, the Group project is 50% of module while the other 50% is delivered though BENG0008 Module delivered by Biochemical Engineering and takes place in Term 2.

1.1 Module Aims

For this module students are required to work on a specific topic under the supervision of a member of the academic staff. Most projects are concerned with solving a particular engineering problem through appropriate design of components, apparatus or systems. Students are thus expected to combine the functions of investigation, analysis, and design in their work. Students are required to view the project as more than just a technical challenge and consider presentation, sustainability, manufacturability, business/commercial aspects, regulatory, societal and ethics perspective, diversity and inclusion (D&I), etc.

This module aims to present students with challenging engineering problems within a working environment that requires a group action. A group of between 5-6 students work together on the project. To facilitate this, projects constitute a Sub-Project within a larger main project context. A group is responsible for one coherent Project context, with each student within the group being responsible for their own Sub-Project. The project work is assessed at regular intervals with separate assessments being applied to both the group progress as a whole and the individual student contribution (the Sub-Project).

In summary, the project focuses upon acquiring the technical knowledge and soft skills which most employers would agree are central to the success of any project, irrespective of the nature of the technical challenges to be overcome.

Important note for students on MECH0044: In addition, the students on Module MECH0044 are required to complete one coursework that is delivered as part of the Module "Commercialisation of Research Ideas" (BENG0008) – Prof Eli Keshavarz-Moore which will allow them to learn about commercial aspects of the innovations. The instructions for this coursework are not included in the Handbook and will be provided by teaching staff on BENG0008 module.

1.2 Intended Learning Outcomes

The Intending Learning Outcomes (ILO) for these modules are aligned with the UK Accreditation of Higher Education Programmes Standard (AHEP) (EC, AHEP, 2020) and all students need to demonstrate that these intended learning outcomes are achieved:

Science, mathematics and engineering principles

M1. Apply a comprehensive knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Much of the knowledge will be at the forefront of the particular subject of study and informed by a critical awareness of new developments and the wider context of engineering

Problem analysis

M2. Formulate and analyse complex problems to reach substantiated conclusions. This will involve evaluating available data using first principles of mathematics, statistics, natural science and engineering principles, and using engineering judgment to work with information that may be uncertain or incomplete, discussing the limitations of the techniques employed

Analytical tools and techniques

M3. Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed

Design

M5. Design solutions for complex problems that evidence some originality and meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

Sustainability

M7. Evaluate the environmental and societal impact of solutions to complex problems (to include the entire life-cycle of a product or process) and minimise adverse impact.

In addition to the learning outcomes listed above the individual report and oral will also assess

Teamwork
M16. Function effectively as an individual, and as a member or leader of a team. Evaluate effectiveness of own and team performance.

Communication
M17. Communicate effectively on complex engineering matters with technical and non-technical audiences, evaluating the effectiveness of the methods used.

1.3 Method of Instruction

The minor taught content of course is delivered through the lectures (information sessions).

The remaining part of the course is non-taught group work that is self-supervised. This includes self-organised group working meetings and group meetings with the project supervisor, which are designed to assist groups in setting and meeting goals, identifying strengths and weaknesses and in disseminating and presenting their work.

1.4 Prerequisites

This is a level 7 course and students are expected to have and apply the knowledge and skill gained in their previous degrees (academic level 6). This will be a basis to build upon a new knowledge at academic level 7. Additionally, some experience of group working and of managing and dealing with team working aspects, will be beneficial to those undertaking this course.

2 Assessment

This module has the following formative and summative assessment elements:

Assessment elements	Assessment Type	Contribution	Due Date
First Presentation	Formative	Team	Week 16
Peer Assessment 1	Formative	Individual	Week 16
Final Report	Summative	Team	Week 28
Peer Assessment 2	Summative	Individual	Week 28
Individual Contribution	Summative	Individual	Week 28
Second Presentation	Summative	Team	Week 29

2.1 First presentation (formative)

Each group presentation should last 10 minutes in total, with each member contributing to the presentation. There will be approximately 5 minutes of questions at the Q&A session.

The presentations should indicate

- What meetings have been held by the group so far
- How the project is being tackled
- Who is responsible for what aspect of the project
- What has been achieved so far
- A detailed schedule for completing the project by the end of term (Gantt Chart)

During the first presentation, the group leader would provide a short synopsis of the project, and subsequently move to each group member presenting their contribution to the project. There will be two academics present. All group members must actively participate in this presentation.

The presentations will be assessed as shown according to the guidelines identified in Appendix 1. This presentation and Q&A session will be formative, the “mark” is for guidance and will not contribute to the overall mark.

Groups will be provided with feedback post-Q&A session; this will allow groups to evaluate the effectiveness of the methods used.

2.2 Second presentation

30% marks (MECH0064) or 15% marks (MECH0044)

Each group presentation should last 15 minutes in total, with each member contributing. There will be approximately 10-15 minutes of questions at the Q&A session. The presentation should report on what has been achieved during project. The contribution of each team member should be specified.

The presentations should indicate briefly

- Each group member's contribution and what they have achieved since presentation 1
- Key features of the design
- Any issues which have arisen pertaining to the work should be highlighted
- An update on the activities previously highlighted on the Gantt chart should be discussed

Similar to the first presentation, the group leader would provide a brief synopsis of the project and move onto each group member presenting their contribution to the project. There will be two academics present. All group members must actively participate in this presentation.

The presentations will be assessed as shown according to the guidelines identified in Appendix 1. Groups will be provided with feedback post-Q&A session.

2.3 Report

55% marks (MECH0064) or 27.5% marks (MECH0044)

Each group should submit a single report. Guidance on what should be included is given in the description of each project, if this is not clear students should contact the academic supervising the project. Each report must include a section on each of the following:

- environmental and societal impact of the design solution which must consider the entire life-cycle of the product or process (cradle to grave) and outline how to minimize any adverse impacts.
- how societal, user, business or customer needs were satisfied. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters and relevant codes of practice or industry standards.

Each member of the group should include a signed statement at the end of the report stating what their contribution has been. The report should be submitted on the course Moodle page under the tab entitled Assessment and Feedback. The marks for the project report will be multiplied by the Peer Assessment Factor.

The collated group project report will be marked according to the guidelines set out in Appendix 2. Note well the report should have a total word count of 12500 words, which excludes tables, figures and their captions, and references.

2.4 Peer Assessment Factor (PAF)

Group members will have the opportunity to score their peer's contribution to the project. First Peer Assessment (end of term 1) is formative only to give indication of Teams dynamics. It will be reviewed by supervisor and discussed with the Team. A second peer assessment is summative and will be used to generate a Peer Assessment Factor (PAF) for each member of the team. The total mark for the report will be multiplied by the peer assessment factor (PAF). All team marks will be scaled by the project supervisor's assessment, to reflect the individual contributions of team members to joint coursework assignments. The teaching staff and external examiners reserve the right to exercise academic judgement in the application of the PAF.

2.5 Individual Contribution

15% marks (MECH0064) or 7.5% marks (MECH0044)

Each student within each group is required to write a 2-page report detailing how they functioned effectively as an individual, and as a member or leader of their group and evaluate the effectiveness of own and team performance. The guidelines and marking criteria are provided in Appendix 3.

2.6 Deadlines

Assessment deadlines will be listed on the module Moodle page. Important announcements will also be made via the Moodle page.

3 Running Your Project

3.1 Your role and responsibilities

At this stage of your career, you are expected to work to the standards of a professional engineer. In the context of the group design project, you are responsible for all parts of work that will lead to a successful completion of the project and independence in the work is expected. This means that, aside from the technical work, you are in full charge of project management (time, human resources etc.), planning the direction of the project, seeking technical/professional experience etc. Use the College and Department's staff members and outside experts as appropriate to obtain technical advice.

Underlying the assessment of the project is the progress that a group makes with a set of goals that they have defined early on in the work. Goals need therefore to be realistic and well-defined, furthermore, they need to be of sufficient breadth or depth to justify a Masters project. So, defining the appropriate project goal is essential. If a group sets out too ambitious goal, they should expect to be assessed on their success (or failure) at achieving it. Alternatively, if a group decides to design just the steering wheel, they should expect to be assessed on the depth of their knowledge of steering wheel technology, and the significance of their contribution to its design.

Finally, remember that the assessments are designed to assess both your individual work and the performance of your group. Your final mark is the weighted total of all these assessments, so it is in your interest to ensure that everyone in your group "pulls their weight". Enjoy your project!

3.2 Project Allocation

Students will self-form groups to work on their chosen design projects. The group will formed of 6-8 students as follows:

- MECH0044 Projects Biomaterials students only
- MECH0064 Projects Mix of Power Systems and Mechanical Engineering students (50/50 split)

3.3 The Role of Your Project Supervisor

Your project supervisor has two roles. The first is to provide professional mentorship and guidance during the progression of the project. The second is to assess your work and contribution to the team's efforts through the channels provided by the module structure: progress meetings, portfolio/interview, and access to your peer reviews. The group should meet with the supervisor regularly.

The project supervisor is not:

- The team's project manager. The responsibility for planning and implementing the project is yours. Independence and effectiveness in project planning and management is assessed in all assignments.
- The team's technical director. While you can rely (sometimes significantly) on your supervisor's technical experience, you are encouraged to seek consultation with other specialists as needed. Similarly, you are encouraged to exert independence on establishing the team's technical goals.
- The team's trouble-shooter or disciplinarian. If there are problems in your team dynamic, be proactive about identifying them *as soon as they arise* and developing a risk mitigation strategy to deal with them. Do seek the professional advice of your supervisor or approach Module Coordinator. Do not leave these issues for the end of the project, hoping that they will disappear or that they will be dealt with by the supervisor's assessment.

3.4 Resources

As part of project management, it is the group's responsibility to plan the resources required for the project:

- Adequate workspace and equipment,
- IT Resources: Computer resources, access to software (installation and licensing), Data backup, connectivity and remote access to UCL hardware,…
- Data management and any additional administrative requirements (ethics approval, legal documents, IP matters, etc.)
- Skills training and support if needed (academic writing, use of instrumentation, safety etc.)
- Ethics approval,…

Information to support you with resources is provided in the "Resources" tab on the Project Moodle page. You will find information on IT, Health, Safety and Security, Data Management, Workshop/Laboratory work, Ethics, Library resources, Academic writing and communication.

Software: Students can use any software that is available at UCL. For most common software PGTA support might be available but self-learning is expected. For any other specialised software suggested by a supervisor, discuss with them how to gain access and if support can be available.

Currently, all the departmental software is available on the MechEng servers, Minion and Winion. You can connect to them via Desktop and UCL Anywhere, or UCL VPN.

Reading list

The Reading list is available via the module Moodle page In particular, the following textbooks are recommended

1) Group dynamics and project management:
    - J. Owen, *How to Manage*, Prentice Hall 2009
2) Engineering Design
    - G. Dieter, L. Schmidt, *Engineering Design, 5th ed.*, McGraw Hill, 2013
    - C. L. Dym, P. Little, E. J. Orwin, *Engineering Design: A Project –Based Introduction, 4th ed.*, Wiley, 2014
3) Concept Generation
    - G. Dieter, L. Schmidt, *Engineering Design, 5th ed.*, McGraw Hill, 2013
    - K. Gadd, *TRIZ for Engineers: Enabling Inventive Problem Solving*, Wiley 2005
    - M. A. Orloff, *Inventive Thought Through TRIZ*, Springer, 2006
    - L. Shulyak, ed., *The Innovation Algorithm*, Technical Innovation Center Inc, 2000

APPENDICES

Appendix 1.

Marking Criteria for Oral presentations

Note: Not all facets in the criterion are required to demonstrate the levels.

Weight: 60%	**Oral Presentation**
90 – 100 (exceptional)	This ***exceptional*** presentation would be highly regarded on an international conference. **Delivery**: Exceptional delivery with clear vocals, consistent eye contact with audience, excellent pace and timing, enthusiasm and confidence evident. **Structure & Content**: Excellent structure with highly effectively organised content. All information is of a high quality and presented in a logical sequence making it engaging and easy to follow. **Visual Aid/Material**: Material is of ambitious design, exceptionally clear and informative. Various media may be incorporated. References used throughout. **Teamwork**: Excellent teamwork and all members of the group must have made significant contribution to the preparation and delivery of the presentation.
80 – 89 (excellent)	This ***excellent*** presentation would be suitable for an international conference. **Delivery**: Excellent delivery with clear vocals, consistent eye contact with audience, excellent pace and timing, enthusiasm and confidence evident. **Structure & Content**: Excellent structure with highly effectively organised content. All information is of a high quality and presented in a logical sequence making it engaging and easy to follow. **Visual Aid/Material**: Material is of excellent design, exceptionally clear and informative. References used throughout. **Teamwork**: Excellent teamwork and all members of the group must have made noticeable contribution to the preparation and delivery of the presentation.
70 – 79 (very good)	This ***very good*** presentation would be suitable for an international student conference. **Delivery**: Very good delivery with clear vocals, consistent eye contact with audience, very good pace and timing, high level of confidence. **Structure & Content:** Very good structure and mostly high quality content. Majority of information is presented clearly and in a logical order. **Visual Aid/Material**: Material is very well designed with very good data/results presentation and contains only some minor errors/omissions. **Teamwork**: Very good teamwork and all members of the group must have made noticeable contribution to the preparation and delivery of the presentation.
60 – 69 (good)	**Delivery**: ***Good*** vocal delivery, generally consistent eye contact with audience, good pace and timing, good enthusiasm and confidence. **Structure & Content**: Good structure and content with some weaknesses. The information is presented in a logical order which is easy to follow. **Visual Aid/Material**: Material is ***well designed*** and clear with some errors/omissions. Some data representation can be further improved and some references missing. **Teamwork**: Clear evidence of teamwork is required, and all members of the group must have made some contribution to the preparation and delivery of the presentation.
50 – 59 (satisfactory)	**Delivery**: ***Satisfactory*** vocal delivery, some eye contact with audience, reasonable pace and timing, some enthusiasm and confidence. **Structure & Content**: Some weaknesses in structure and content. Generally, most of the information is presented in a logical order which is relatively easy to follow. ***Some weakness/omissions are evident***. **Visual Aid/Material**: Material is satisfactorily designed, reasonably clear, informative but contains several errors/omissions. Data presentation difficult to follow. Lack of references throughout. There may be some inappropriate use of media or presentation styles. **Teamwork**: Some evidence of teamwork is required, and all members of the group must have made some contribution to the preparation and/or delivery of the presentation.
40 – 49 (unsatisfactory)	**Delivery**: ***Poor*** vocal delivery with limited eye contact with audience, uneven pace, poor timing and limited confidence. **Structure & Content:** Significant weaknesses in organisation making the presentation difficult to follow. Significant weaknesses/gaps in the content. **Visual Aid/Material**: Material is informative and relevant. Severe design, layout and/or presentation style issues. Contains a significant number of errors/omissions. **Teamwork**: Evidence of teamwork is poor, and not all members of the group have contributed to the preparation and/or delivery of the presentation.
30 – 39 (poor)	**Delivery**: ***Very poor*** vocal delivery: monotonous, no eye contact with audience (e.g. reading), very poor pace and timing. Complete lack of enthusiasm and confidence. **Structure & Content:** Poor organisation, effectively incoherent. Essential information missing and substantial weaknesses/gaps evident. **Visual Aid/Material**: Unprofessional material with confusing or distracting style and high number of errors/omissions. **Teamwork**: Evidence of teamwork is lacking, probable that presentation is prepared by only a few members of the group with minimal or no input from remainder.
0 – 29 (unacceptable)	***Unacceptable*** information demonstrating lack of ability to present a project and communicate findings. Delivery, Structure & Content and Visual Aid/Material unacceptable for MSc level. Little or no evidence of teamwork.

Note: Not all facets in the criterion are required to demonstrate the levels.

Weight: 40%	**Interview (Q&A Session)**
90 – 100 (exceptional)	An ***exceptional*** performance during the interview. Student easily links work performed with examples from research and engineering not only limited to subject matter but wider field. While answering the questions, student demonstrates ability to hypothesise on the spot outside of the scope of the project (e.g. potential future findings and/or applications in other fields), thus demonstrating ability to apply new approaches on the wider field of engineering. Student is full understanding of their role within their group and how this relates to their project aims.
80 – 89 (excellent)	An ***excellent*** and well-executed interview demonstrating deep understanding of the project. Student is able to answer all questions with confidence, concisely and accurately and hypothesise on the spot supporting claims with good examples from the project, literature and engineering practice. There is a clear evidence of exhaustive background knowledge on the subject matter but also wider discipline. Student has full understanding of their role within their group and how this relates to their project aims.
70 – 79 (very good)	A ***very good*** interview where all expectations are met and almost faultless. Student is very confident and able to address all but most searching questions accurately and concisely. This demonstrates a very good understanding of the project, their role in the project, and background knowledge on subject matter. In addition, student is able to link project findings with the relevant references and practical examples in engineering practice and hypothesise on the spot within the project scope.
60 – 69 (good)	A ***good*** interview where the majority of the expectations were met. Student demonstrates a good understanding of the project (objectives, approach and findings) and there is evidence of background knowledge supporting it. However, not all questions were addressed correctly or required some prompting, showing a few gaps in the understanding of the relevant subject matter. Where appropriate good students use backup slides or whiteboard to illustrate answers. Student understands their role within their group and how this relates to their project aims.
50 – 59 (satisfactory)	A ***satisfactory*** interview where main expectations were met. Student demonstrates satisfactory understanding of the project (objectives, approach and findings), however background knowledge is limited to very narrow area of the subject matter. There are significant gaps in the understanding of the relevant subject matter. Student may require some prompting. Student is aware of their role within their group and how this relates to their project aims.
40 – 49 (unsatisfactory)	An ***unsatisfactory*** interview with significant weaknesses being apparent. Most of the questions were not answered correctly. Student demonstrates only partial understanding of the project and substantial gaps in background understanding. Student is not clear of their role within their group and/or how this relates to their project aims.
30 – 39 (poor)	A ***poor*** interview with most of the questions not correctly answered. The student demonstrated knowledge of the presented material but did not demonstrate the understanding of the project objectives and chosen approach. A substantial lack of background knowledge is evident. The student appears to be working as an individual rather than a member of a group and cannot relate their output to that of the group or the aims of the project.
0 – 29 (unacceptable)	An ***unacceptable*** interview with almost all questions unanswered. Student did not demonstrate knowledge of the project.

Appendix 2.

Marking Criteria for Group Design Report

One mark per report. Each report for MECH0064 must include two sections, one each on the following:

- Sustainability: environmental and societal impact of the design solution which must consider the entire life-cycle of the product or process (cradle to grave) and outline how to minimize any adverse impacts.
- Design: how societal, user, business or customer needs were satisfied. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters and relevant codes of practice or industry standards.

Word limit:

Maximum word count for the Group Report: 12,500 words. Where the word count is exceeded, a penalty will apply of a deduction in marks of 10 percentage points, as per the UCL regulations.

Weight: 10%	**Report Presentation and Structure** *including: language, referencing, data presentation and report organisation and flow*
90 – 100 **(exceptional)**	***Exceptionally*** well written report using appropriate academic style of writing, references and excellent flow of argument. Almost faultless and consistent with the presentation and structure found in a good journal paper. Must exceed all criteria in ”excellent” band
80 – 89 **(excellent)**	***Excellent*** report presentation and technical writing style. *Excellent* organisation making report very coherent and easily readable with additional resources presented in well formatted appendices. A few grammar or spelling errors exist. All figures and data presentation are consistent, graphs and diagrams must well-presented and easy to interpret. Standard reference style correctly implemented throughout.
70 – 79 **(very good)**	***Very good*** report organisation ensuring clear flow and argument. Overall very well and clearly written. Sentences and paragraphs are predominantly well structured. A few grammar or spelling errors exist. A small number of graphs are not clear or diagrams of mediocre quality. Some minor issues with symbols of equations. Standard reference style correctly implemented. Attention to detail is evident
60 – 69 **(good)**	Writing is ***good*** and overall readable. Very good organisation and structure easy to follow. Several sentences or paragraphs are too complicated and/or difficult to interpret. Some graphs and figures are difficult to understand and/or not very well presented. For many references, full details not included.
50 – 59 **(satisfactory)**	Writing is ***satisfactory*** but lacks clarity. Some weaknesses in organisation making it difficult to read. Some sentences or paragraphs are hard to interpret. Many graphs and figures are difficult to understand and/or not very well presented however it should be possible to understand intention For some references, the complete description is missing. Lack of attention to detail e.g. with formatting, significant figures and units.
40 – 49 **(unsatisfactory)**	***Unsatisfactory*** report organisation with missing material or redundancies. Graphs and figures are of low standard, difficult to understand and intention is often obscure Writing Requires a *substantial editing*. Sentences are not thoughtfully organised into paragraphs with a significant number of grammar/spelling errors. References incomplete and reference styles mixed.
30 – 39 **(poor)**	***Poor*** organisation and structure with obvious missing material and redundancies. Writing style is *unprofessional and/or inappropriate*. Poor sentence and paragraph structure making it difficult to read. No attention to detail. Figures and diagrams are messy or cut and pasted, often lacking relevance or meaning. Figures copied without references. References (if they exist) very poorly assembled.
0 – 29 **(unacceptable)**	Report is ***unacceptable***; completely disorganised and *impossible to understand* the work presented. Command of written English is unacceptable and inconsistent. No original figures/data presented. ***No or negligible*** evidence of understanding of referencing system and digital literacy

Weight: 15%	**Objectives & Applied Approach/ Methods** *including determining aims, objectives and approach/methods applied*
90 – 100 **(exceptional)**	Project aims and objectives are excellent and have really stretched the student, at the ***forefront*** of state of the art in the discipline. Report displays ***excellent*** grasp of a range of approaches/methods applicable to the project in-line with the *advance* scholarly practice and the originality in their application. The project has an *innovation* potential. Must exceed all criteria in ”excellent” band
80 – 89 **(excellent)**	Project aims and objectives are ***ambitious*** and very well defined, and supported with sound argument, heading towards the state of the art in the discipline. Report displays ***excellent*** grasp of a range of approaches/methods in line with project aims and the current scholarly and engineering practice. Approach/methods applied demonstrate *originality and creativity* and are excellently suited for the problem.
70 – 79 **(very good)**	Project aims and objectives are ***very well*** defined and supported with argument. Report displays ***very good*** grasp of a range of methods and approaches applicable and shows *originality* in their application.
60 – 69 **(good)**	Demonstrates ***good*** ability to frame and create questions, and apply suitable approach/methods. Report displays a *comprehensive* understanding of the method/approaches applicable to the problem. Shows some *originality* in their application and a good understanding of how the established approach will achieve the project objectives.
50 – 59 **(satisfactory)**	Project aims and objectives are ***clearly defined*** and in line with aims/topic. Shows ***satisfactory*** understanding of how the selected approach/methods will achieve the objectives and originality in combining knowledge and techniques. However, approach applied has some *significant* weaknesses.
40 – 49 **(unsatisfactory)**	Stated objectives only ***partially contribute*** to the project topic/aims. Approach/method applied not clearly explained, not fully applicable to the project and/or with *substantial* weaknesses.
30 – 39 **(poor)**	The objectives stated are *inconsistent* with the project aims. Approach/methods applied are ***not appropriate*** for the objectives stated.
0 – 29 **(unacceptable)**	Project’s aims/objectives ***not stated***. Objectives specified are ***not related*** to the project topic. The approach/methods not stated or specified.

Note: Not all facets in the criterion are required to demonstrate the levels.

Weight: 45%	**Quality of Technical Content** *including: demonstrating knowledge & understanding, problem solving, effort and scope & quality of student's technical work (e.g. numerical, analytical work, design and coding)*
90 – 100 (exceptional)	This work meets and often *exceeds* the standard for distinction, as described in the 80-89 band. The work has innovation potential and is of publishable quality. Must exceed all criteria in "excellent" band
80 – 89 (excellent)	Work of *excellent* standard, reflecting, in-depth knowledge and understanding. Excellent effort and scope of technical work. Displays mastery of a range of techniques. Shows notable originality in application of knowledge. Providing an excellent analysis of alternative designs, demonstrating excellent application of engineering principles. Demonstrates autonomy and notable originality in tackling the demanding problems.
70 – 79 (very good)	Work of very good standard, reflecting significant knowledge and understanding and critical awareness of current problems and/or new insights. Very good effort and scope of technical work. Displays very good grasp of a range of techniques. Providing very good analysis of alternative designs, demonstrating a very good application of engineering principles. Demonstrates a very good comprehension of sustainability issues over entire lifecycle of design. Demonstrates self-direction and originality in tackling the *demanding* problems.
60 – 69 (good)	Demonstrates a *systematic* knowledge, understanding and critical awareness of current state of the art. Displays a comprehensive skills in techniques applied. Demonstrates significant effort and a well-defined focus. Nearly all of the stated objectives are met. Alternative designs are analysed using engineering principles. Sustainability is considered using appropriate techniques but perhaps not over entire lifecycle of design. Shows originality in the application of knowledge. Demonstrates self-direction in tackling the problems.
50 – 59 (satisfactory)	Demonstrates a *sound* knowledge and understanding of specialised field with some gaps. Acceptable level of effort and scope of technical work. Demonstrates satisfactory skills in applied techniques. Only a proportion of the stated objectives are met. Alternative designs are compared satisfactorily. Sustainability must be considered and some relavent analysis is required. Demonstrates ability to collect and analyse data. Effective in identifying, defining and solving complex problems.
40 – 49 (unsatisfactory)	Demonstrates some knowledge and understanding of the field, but ***unsatisfactory*** with *substantial weaknesses/gaps* in some key areas. Demonstrates some skills in selected techniques but with significant weakness in execution. Majority of the objectives are not achieved. Alternative designs are presented but the comparison is not supported by proper analysis. Some consideration of sustainability but analysis could be limited or non existent. Student's effort and scope of technical work are very limited. Some ability to define and solve a complex problem.
30 – 39 (poor)	Demonstrates *substantial weaknesse*s in the knowledge base, and/or reproduces knowledge *without* evidence of understanding. Minimal scope of technical work. Work presented does not contribute to objectives/aims defined. Lacks a review of possible designs for the engineering problem. Little, or no, consideration of sustainability. Little or no skills demonstrated in selected techniques. Inability to define and solve the complex problems.
0 – 29 (unacceptable)	*Fails* to demonstrate knowledge of the field. The original technical work ***not presented***. Inability to recognise the fundamental problems.

Note: Not all facets in the criterion are required to demonstrate the levels

Weight: 30%	**Critical Analysis, Discussion and Conclusions** *including: critical analysis of the results, quality assessment, hypothesising and making conclusions*
90 – 100 (exceptional)	In addition to described under 80-89 band: The analysis and conclusions are of sufficient *originality* and *novelty* and is likely to receive a similar judgement if submitted to a peer-reviewed journal for independent review. Must exceed all criteria in 80-89 band
80 – 89 (excellent)	In addition to described under 70-79 band: Shows *excellent* ability to evaluate methodologies critically robustly supported by evidence and, where appropriate, to propose new hypotheses. The technical work is subjected to rigour quality assessment in line with engineering practice. Excellent critical assessments of designs and their sustainability are provided supported by evidence including Excellent suggestions for future improvement. Deals with complex issues systematically and creatively, making excellent judgements.
70 – 79 (very good)	Very good critical analysis demonstrated strong conclusions supported by evidence, all key points should be covered. The technical work is subjected to *rigourous quality assessment* in line with engineering practice. Demonstrates ability to evaluate methodologies critically. Very good critical assessments of designs and their sustainability are provided supported by evidence including very good suggestions for future improvement. Deals with complex issues systematically and creatively, making very good judgements. Identifying potential new hypotheses that require further investigation.
60 – 69 (good)	Demonstrates confidence in critical analysis of the finding and making sound conclusions supported by evidence covering most but not all key points Demonstrates ability to deal with complex issues both systematically and creatively. Appropriate assessments of designs and their sustainability are provided mostly supported by engineering principles and including suggestions for future improvement. Demonstrates ability to make sound judgements in the absence of complete data.
50 – 59 (satisfactory)	Provides evidence of the relevant and sound analysis within the specialised area, with *some* critical evaluation which must include sustainability Is able to analyse technical issues and make appropriate judgements and draw conclusions which should have at least some supporting evidence. Assessments of designs are provided with some reference to the engineering principles. At least some of the key points must be covered.
40 – 49 (unsatisfactory)	Critical analysis and discussion are *unsatisfactory*. Result analysis are appropriate, but with some substantial errors and/or inconsistencies which affect the soundness of argument and/or conclusions. Demonstrates very limited critical ability. Assessments of designs including sustainability are superficial and are not justified by engineering principles. Conclusions might not be supported by evidence and some might even be incorrect.
30 – 39 (poor)	Shows *little* or no critical ability. Poor, inconsistent analysis. Assessments of designs are not provided and little consideration of sustainability. Conclusions are incorrect and/or not supported by valid argument.
0 – 29 (unacceptable)	***No or negligible*** *critical analysis* and discussion was *conducted*. Lack of clear conclusions and/or conclusions are inconsistent with the project aims

Note: Not all facets in the criterion are required to demonstrate the levels

Marks %	Overall Assessment
90 – 100 (exceptional) [Distinction]	Exceptional report demonstrating in-depth knowledge and understanding on wider range of subjects. A novel design is provided which potentially can be patented. The work and critical analysis are of sufficient *novelty/originality* and is likely to receive a similar judgement if submitted to a peer-reviewed journal for independent review. For sustainability a comprehensive life cycle analysis has been conducted.
80 – 89 (excellent) [Distinction]	Excellent work is subjected to rigour quality assessment. Deals with complex issues systematically and creatively, making excellent judgements. A novel design is presented that addresses the engineering problem fully. Report presentation is outstanding in line with professional standard and engineering practice. Clear evidence of independent thought and thorough understanding of the problem. For sustainability a good life cycle analysis has been conducted.
70 – 79 (very good) [Distinction]	Work of *very good* standard, well rounded, reflecting in-depth knowledge and understanding and excellent critical analysis. A very good design is presented that addresses the engineering problem fully. Demonstrates self-direction and originality in tackling the *demanding* problems suggesting creative solution subjected to *rigour quality assessmen*t in line with engineering practice. Sustainability is considered over entire lifecycle of design.
60 – 69 (good) [Merit]	Good quality and scope of work well presented, demonstrating a *systematic* knowledge, understanding and critical awareness and ability to make sound judgements. A good design is provided that can address most of the design requirements. Sustainability is considered but perhaps not over entire lifecycle of design.
50 – 59 (satisfactory) [Pass]	Satisfactory report, some achievement but also some significant *weaknesses/gaps* in some key areas/skills are evident. A design is provided that can address the engineering problem partially. Some consideration of sustainability is evident. Just satisfies all the learning outcomes
40 – 49 (unsatisfactory) [Fail]	Unsatisfactory. A small scope of work inconsistently presented demonstrating ***unsatisfactory*** knowledge and understanding with *substantial weaknesses/gaps* in some key areas. The provided design fails to address some major requirements and/or little or no consideration of sustainability. Does not satisfy all the learning outcomes
30 – 39 (poor) [Fail]	Poor. A small scope of work done, probably poorly presented. The design is inadequate and can not provide the required function. The understanding of the subject is not demonstrated as the objectives and methods selected are not aligned and/or achieved.
0 – 29 (unacceptable) [Fail]	*Very poor.* An unacceptable effort.

References:

Appendix 2 & 3 Marking guidelines: Fung D. UCL Student Assessment Criteria for Taught Programmes an Illustrative Guide. Centre for Advancing Teaching and Learning, UCL September 2015

Learning outcomes: AHEP4 Engineering Council, 2021

Appendix 3.

UNIVERSITY COLLEGE LONDON
DEPARTMENT OF MECHANICAL ENGINEERING

MSc Group Project: Individual Contribution

Individual Contribution 15% marks (MECH0064) or 7.5% marks (MECH0044)

Each student within each group is required to write a 2-page report detailing how they functioned effectively as an individual, and as a member or leader of their group and evaluate the effectiveness of own and team performance.

Part A

Describe how effectively you think your group functioned as a team. Provide two different examples to support your argument.

Part B

When working as member or leader of a team there will always be issues that impact the team. Choose an example of an issue that impacted you as a team member or team leader during the project and write about it addressing the following four points:

1. Identify the issue and its cause
2. Describe what measures were taken to resolve the issue
3. Discuss how effective were the measures, did anything else need to be done?
4. State what you have you learnt from this experience and how will you do things differently next time?

It is important to be clear about your role and that of others.

To avoid any misunderstanding the above is about participation in the group work and what you learnt from working in a group. It is not about technical issues for example how you wrote some CFD code. The tight word limit is deliberate as writing succinctly and distilling key information is a skill.

Marking criteria Part A

Metric ↓	Mark →	0	1 (Fail)	2 (Pass)	3	4
How team functioned		No description	Describes team but not how it functioned	Some description of how group functioned	Description of group and how it performed as a team.	Good, clear description of efficacy of group as a team

Argument	No argument just statements or contradictory argument	Poor argument, weak or flawed logic	Satisfactory argument, may have minor flaws in logic.	Good argument but could be formulated better. No flaws in logic	Good argument that is well formulated, clear and concise logic
Example 1	No example	Example exists but is not relevant to argument.	Example exists and has some relevance to argument	Relevant example that supports argument	Relevant example that supports argument well
Example 2	No example or exactly the same as example 1	Example exists but is not relevant or is relevant but is similar to example 1	Must differ from example 1. Example exists and has some relevance to argument	Must differ from example 1. Relevant example that supports argument	Relevant example that supports argument and in a contrasting way to example 1

Half marks can be used

Marking criteria Part B

Mark	Criteria
9	Must address all aspects of all 4 points succinctly and extremely well.
8	Must address all aspects of all 4 points very well
7	Must address all 4 points well
6	Must address at least 2 points well and all remainder adequately
5 (pass)	Must address at least 3 points adequately or 2 points well
4 (fail)	Only addressed 2 points adequately or 1 adequately and 1 well.
2-3	Has addressed less than 2 points adequately or failed to identify a relevant issue.
1	Small effort or lacks relevance
0	Minimal or no attempt

To generate mark out of 100

([*mark part A*] * (6/16) + [*mark part B*]) * (100/15)

Word limit

Where the word count is exceeded, a penalty will apply of a deduction in marks of 10 percentage points, as per the UCL regulations.