

Instructions for

ME40321: Engineering project

Academic Year 2019/20

prepared by

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Final Year Project Coordinator

September 2019

1. INTRODUCTION

The Final Year Engineering Project ME40321 is the major individual research or design part of the MEng degree programmes in the Department of Mechanical Engineering. Research projects will contain at least 2 of the 3 following elements - analytical, computational, experimental aspects. Design projects will contain specification, design, analysis, manufacture and test work.

Allocation of final year project and preparatory work on the project take place during Semester 1 of the Final Year (30th September to 13th December 2019). During Semester 2 (3rd February to 29th May 2020) students work full time on the project. The project deliverables include:

- Project Scoping and Project Planning Report (5% of the project mark)
- Preliminary project presentation (5%) – made to a panel of 3 examiners
- Final project report (60%)
- Overall performance (10%) - assessed by the supervisor
- Final project presentation, *viva voce* examination and poster (20%).

The final presentation will be made to the supervisor and a member of academic staff who acts as an independent assessor. After the final presentation the student will undergo a *viva voce* examination and the project poster will be evaluated.

General aims of the project

- To provide the student with the opportunity to show creativity and initiative in planning and executing work on a demanding Master's level project in a specific topic area which may include experimental, design, analytical, computational and business components.
- To enable the student to complete a literature survey, an extensive programme of work and appropriate analysis of the results.
- To allow the student to show initiative in organising and following through an investigation and demonstrating the faculty for the critical assessment of information.
- To develop the skills necessary to communicate the results of the research or design project effectively in the form of two reports, two oral presentations, a *viva voce* examination and a poster.

2. PROJECT SELECTION, TIMESCALE AND ASSESSMENTS

Please refer to **Appendix A** for the timescale for the project including assessment milestones and **Appendix B** for the ME40321 unit description. During August - September 2019 academic staff will each nominate 8 projects and input project titles, short descriptions and requirements for technical support into a database on Moodle. The project database will be opened online to students registered on ME40321 during Welcome Week of Semester 1. The projects have three designations: standard project, projects within one of the various student competition teams, and student-initiated projects. You should have all received an email with details of how the final year projects will be allocated.

Allocation of final year projects, together with allocated supervisor and assessor (a second member of academic staff) will be distributed to student and staff by Wednesday 23th October 2019 (Week 4). The allocations will be circulated by email and posted on Moodle. The role of the **assessor** is to assess project work independently at **Assessment stages 1, 3 and 5** indicated in **Appendix A**.

Students should arrange to meet their supervisor at the beginning of Week 5 in Semester 1 to discuss the project aims and to plan preliminary work. It is recommended that students should keep a **log book** to record project activities, preliminary calculations, etc. on a daily

basis. In Weeks 5 to 8 a project plan and literature review will be prepared with a hand in deadline in Week 9 of Semester 1 (Wednesday 27th November 2019). Two mandatory meetings with your assessor are timetabled during Week 5 and Week 9 of Semester 2 when your progress will be assessed. Reference to your **log book** will be useful at these meetings.

Technician Surgery will take place in Week 7 of Semester 1 (Wednesday 13 November 2019) by appointments only (Timetable TBC). This is the opportunity for you to discuss with technical support team about your specific support requirements and:

- To tick off areas under control,
- To ring areas that require significant work,
- To identify areas that have not yet been thought about,
- To raise alarm bells for projects that require too much support.

Ordering supplies: If you need to order items for your project you need to use the order form that is available on Moodle course page. Your supervisor needs to e-mail the completed form to the Faculty Finance Office and use the project code BA-ME2FGN. There is a limit of £250 per student per project.

An indication of Assessment Criteria and Grade Descriptors for ME4 units is attached in **Appendix C**.

A summary of all assessment stages follows:

Assessment 1. Submission of project scoping, planning and literature review. This document (The word count for this document is set at 2500 word) includes a description of the work to be undertaken, a realistic time and resource plan for the project and a preliminary review of the literature. **Hazard evaluation and safety approval form, Generic risk assessment form** (affected students only) and **Chemical hazard risk assessment form** (affected students only) must also be submitted. The forms are available on Moodle. The deadline is Wednesday 27th November 2019. **(5% of unit mark)**

Assessment 2. Preliminary project presentation. This activity will take place on Tuesday 3rd March 2020 in the fifth week of Semester 2 (w/c 2nd March 2020). The student will outline the background to the project, review the salient literature and present preliminary results and a project plan for the coming semester. The presentation should be made through the medium of PowerPoint or similar software and should last for 5 minutes followed by 5 minutes of questions (The timetable TBC). The presentation will be assessed by a panel of academic staff and a small cohort of student colleagues will also be in attendance. **(5% of unit mark)**

Assessment 3. Final Project Report. The student will prepare and hand in a final project report by 16:00 on Wednesday 29th April 2020. The report is marked by the student's supervisor and the project assessor. **(60% of unit mark)**

Assessment 4. Performance assessment. The student's supervisor will make an independent assessment of performance based on factors such as understanding, effort, quality of work etc. **(10% of unit mark)**

Assessment 5. Final project presentation, viva voce examination and poster presentation (during the period Thursday 30th April to Tuesday 12th May 2020). These marks are awarded in one seating at the time of the viva. Please note **it is your responsibility to organise a time and date** for your viva with your supervisor and assessor.

Final project presentation: After the project report hand-in on Wednesday 29th April 2020 the student will prepare a 10-minute PowerPoint or similar presentation summarising their project including background, methods, principal results and conclusions. The presentation will be assessed by the supervisor and assessor.

Viva voce examination: After the presentation, the student will be examined by the assessor in the presence of the supervisor and the student will defend the content of their project report. The aim is to establish both the student's original contribution to the project work and their depth of understanding of the project content.

Poster: The student will need to bring along an A3 copy of a poster to the viva and leave this behind, so the assessor and supervisor will mark it once the student has left the room. The poster needs to clearly summarise and express the essence of the project activity. A template and Guidelines for the poster will be provided on Moodle by Andrew Avent (4E2.29B). Please ask your supervisor to feedback any changes they will want you to implement on your poster in view of the design exhibition.

Project synopsis: The student will also submit via Moodle a 75 word synopsis of their project, as well as 2 photos inclusive of captions you wish to enter for the FY photo competition, by 16:00 on Wednesday 29th April 2020 for inclusion in the booklet for the Design and Project Exhibition. Instructions are available on Moodle course page.

The final project presentation (7%), *viva voce* examination (11%) and poster presentation (2%) can be expected to last for up to one hour. (20% of unit mark)

Design and Project Exhibition. Posters (PDF format only) should be submitted via Moodle for printing and lamination by 22:30 12th May 2020 at the latest. The poster will be displayed at the Design and Project Exhibition which is to be held on Wednesday 27th May 2020. Students will be expected to present their poster to visitors and the External Examiners for the Department's degree programmes will be present at the exhibition. There is also a competition for best poster which is not part of the academic assessment process. First, second and third prizes will be awarded for the best posters at the Reception on Degree Ceremony day.

3. PROJECT SCOPING, PLANNING AND LITERATURE REVIEW

Students are required to submit one paper copy to Faculty Student Centre AND one electronic copy via Moodle of a project scoping, planning and literature review, together with (via Moodle only) Hazard evaluation and safety approval form, Generic risk assessment form (affected students only) and Chemical hazard risk assessment form (affected students only), by 16:00 on Wednesday 27th November 2019. The project scoping, planning and literature review (2,500 words maximum) should include the following elements:

Title page: the project title, your name, the name of your supervisor and assessor and date. See example in **Appendix D**.

Summary: approx. 300 words. (10% of report mark)

Introduction/background and literature review: (30%)

Aims and objectives: (10%)

Work plan including Methodology and deliverables: (30%)

Predicted timescale: (10%)

References: list your literature sources (See Section 6 below). Not included in the word count. Emphasis should be placed on references from journals.

There is a further 10% component of the report mark awarded for the quality of the report including report structure, manner of presentation (e.g., choice of words and clarity of expression, conciseness), standard of English, layout and references (use of a consistent and correct style of referencing with good coverage of papers).

The purpose of the report is to ensure that (a) the objectives of the project are clearly defined and understood at the outset and (b) the resources required for the project have been identified and are accessible to the student (please consult technicians in Week 7 at the **Technician Surgery**). Of course, the final outcome of a project cannot always be foreseen. The project plan and literature review should not be regarded as a "contract" to undertake a piece of work against which the results will be judged when the subject is assessed. Rather, it should be regarded as a definition of the starting point of the project.

4. FINAL YEAR PROJECT REPORT

Students are required to submit one paper copy of the final report to the Faculty Student Centre AND one electronic copy via Moodle by 16:00 on Wednesday 29th April 2020. The final project report should contain the following components (percentage of report mark in brackets):

Title page: See example in **Appendix E**.

Summary: summarise what you set out to achieve, how you reached your objectives and summarise results and conclusions in 250 - 400 words **(5% of report mark)**.

Acknowledgements: acknowledge anyone who has assisted you in completing your project work.

Table of Contents: a list of sections and sub-sections with page numbers.

Introduction: provide the background to the project, the aims and objectives and the layout of the report; the latter only if appropriate. **(10%)**

Literature review: concisely review the relevant literature using a consistent referencing system. Link this review to your project aims. **(10%)**

Experimental and/or computational methods: describe how you achieved the project objectives in sufficient detail that the work could be repeated by someone else, perhaps working in a different University. **(10%)**

Results and analysis: present your results in graphical and tabular form providing appropriate numerical and statistical analysis where appropriate. **(30%)**

Discussion: draw the threads of your project work together and relate outcomes to the literature review. Discuss errors and uncertainty. Refrain from introducing too much new material in this section. Discuss any ethical implications of your findings. **(10%)**

Conclusions: summarise the major outcomes of your research. **(5%)**

Future work: indicate where future project work could develop and enhance your results.

References: list your literature sources. Emphasis should be placed on peer reviewed sources (i.e. journal papers).

Appendices: provide additional information such as data sheets, computer programmes and engineering drawings at the end of the report. Do not use appendices as a dumping ground for stuff you have not been able to present in the main body of the report.

There is a further **20%** component of the project mark awarded for the quality of the report including order (logical sequence of material), style (the manner of writing; choice of words and clarity of expression, conciseness), standard of English (grammar, punctuation and spelling), layout (use of paragraphs, headings, numbering, tables and figures) and references (use of a consistent and correct style of referencing with good coverage of papers sourced from journals).

The word count for this document is set at **12,000 words**. Please note that this is a limit and not a target! Submissions exceeding the word count will attract penalties according to current University regulations (QA16 paragraph 9.3). In calculating the word count summary, tables and figures (and relative captions), table of contents, lists of figures and tables, appendices and references are excluded. Footnotes or endnotes are included in the

word count. Please note that tables are primarily to be used for displaying numerical or indexed data, on very few instances they can contain limited text and they most definitely should not contain fully formed sentences or excessive amounts of text. Tables displaying the latter characteristic will be included in the word count and markers will be instructed to reflect the inappropriate use of tables in the mark they award for quality of the report.

Supervisors will be prepared to provide guidance on the report structure however they will not read and provide feedback on the final draft copy.

5. HEALTH AND SAFETY

Students will **not** be permitted to commence work on their projects until the Hazard evaluation and safety approval form (ALL students), Generic risk assessment form (affected students only) and Chemical hazard risk assessment form (affected students only) have been completed and submitted via Moodle. The forms will be available on Moodle. Please contact David Williams, Safety Coordinator, if you require further information at: d.l.williams@bath.ac.uk.

6. REFERENCING AND PLAGIARISM

A guide to referencing and plagiarism is available at:

<http://www.bath.ac.uk/library/infoskills/referencing-plagiarism/>.

6.1. Referencing

Either the Harvard or a Numeric referencing system may be used.

6.2. Plagiarism

Plagiarism is a serious academic offence. Comprehensive information on plagiarism is provided at:

<http://www.bath.ac.uk/library/help/infoguides/plagiarism.html>

For detection of plagiarism, the University has adopted a web-based plagiarism detection service–Turnitin. All students are required to submit copies of the project plan and literature review and the final report electronically via Moodle.

7. ETHICAL CONSIDERATIONS

The University of Bath's Institutional Code of Ethics may be found at:

<http://www.bath.ac.uk/vc/policy/ethics.htm>

The Royal Academy of Engineering (RAE) statement of ethical principles for engineers can be found at: <http://www.raeng.org.uk/policy/engineering-ethics/ethics>.

Understanding professionalism and the economic, political, moral and environmental impact of their work is now a requirement for professional engineers. As part of the project work, students must demonstrate that consideration has been given to such issues under the heading of Ethics and Professionalism. The report should include evidence that potential ethical issues (if applicable) have been identified, analysed and responded to effectively in a professional manner according to the principles outlined in the RAE statement.

Please contact Dr Zhijin Wang, the Departmental Research Ethic Officer of Mechanical Engineering, if you require further information at: Z.Wang@bath.ac.uk.

8. REQUESTS FOR EXTENSIONS, LATE SUBMISSION OF WORK, MITIGATING CIRCUMSTANCES

NB: The University have introduced a uniform penalty scheme for late submission of work: QA16 section 8:

<http://www.bath.ac.uk/quality/documents/QA16.pdf>

QA16 states that:

Requests for extensions and penalties for late coursework:

8.1 Requests for extensions (QA16 Form 1) should be submitted by a student to the Director of Studies for consideration in cases where the majority of units are based within one Department/School. Where this is not the case the Unit Convenor should consider the request and consult with the appropriate Director of Studies.

8.2 Agreed late coursework should normally be submitted before the remaining coursework is returned to the main student body.

8.3 Coursework submitted after the deadline without prior approval will normally receive a maximum mark of 40% or the relevant pass mark.

8.4 Coursework that is handed in after five working days, without prior approval, will normally receive a mark of zero.

Request for an extension

Students who have compelling reasons and evidence for not being able to meet a project deadline may request an extension. The extension request must be supported by the supervisor. Students are advised to discuss their case with the Director of Studies prior to submitting a form.

Mitigating circumstances

A student who wishes any mitigating circumstances to be taken into account by the Board of Examiners for Programmes can find the guidance for students at:

<http://www.bath.ac.uk/registry/imc/imc-students.html>

9. FURTHER INFORMATION

Please contact me if you require further information at: Z.Wang@bath.ac.uk.

Advanced planning and diligence are essential factors in delivering a high-quality project.

I wish you success with your project work!

APPENDIX A.

Timescale for Final year MEng project (ME40321) for academic year 2019/20

| | Week | w/c | Activity/action |
|--------------------|--------------|---------|---|
| Semester 1 2019 | Welcome | 23 Sept | Wed 25 Sep 19 at 9:00AM - FYP database opens to students |
| | 1 (S1 wk1) | 30 Sep | --- |
| | 2 (S1 wk2) | 7 Oct | Fri 11 Oct 19 at 16:00: <ul style="list-style-type: none"> FYP database becomes read only Deadline for student-initiated projects and allocation of competition projects Student choices database opens to students |
| | 3 (S1 wk3) | 14 Oct | Wed 16 Oct 19 at 16:00 - Student choices database closes. All choices to be submitted |
| | 4 (S1 wk4) | 21 Oct | Wed 23 Oct 19 - Project allocation details distributed to students and staff |
| | 5 (S1 wk5) | 28 Oct | Arrange to meet your project supervisor this week Project familiarisation and background reading |
| | 6 (S1 wk6) | 4 Nov | Discuss draft plans and resources required with supervisor Start sketching manufacturing drawings of parts required if appropriate |
| | 7 (S1 wk7) | 11 Nov | Wed 13 Nov 19 from 9:15AM - Technician Surgery by appointment only Timetable TBC – please contact Zhijin if unable to attend |
| | 8 (S1 wk8) | 18 Nov | Tue 19 Nov 19 – Technician allocation complete and students notified Meet with assigned technician to finalise project requirements |
| | 9 (S1 wk9) | 25 Nov | Wed 27 Nov 19 at 16:00: Assessment 1: Project Scoping and Planning (5%) submit one electronic copy via Moodle AND one paper copy via Faculty Student Centre. Also submit via Moodle only: Hazard evaluation and safety approval form – all students Generic risk assessment form – affected students only Chemical hazard risk assessment form – affected students only |
| | 10 (S1 wk10) | 2 Dec | Continue discussions with assigned technician, Finalise part drawings for manufacture, Check activities are proceeding as planned |
| | 11 (S1 wk11) | 9 Dec | |
| | 12-18 | 16 Dec | Vacation, revision week, University exams, inter-semester break |
| Semester 2 2020 | 19 -22 | 3 Feb | Full time project work |
| | 23 (S2 wk5) | 2 Mar | Tuesday 3 Mar 20 All day - Assessment 2: Preliminary project presentations (5%), timetable TBC First assessor meeting Liaise with project assessor to organise a meeting this week Upload First assessor meeting sheet onto Moodle no later than 22:30 Fri 6 Mar 20 |
| | 24 - 26 | 9 Mar | Full time project work |
| | 27 (S2 wk9) | 30 Mar | Second assessor meeting Liaise with project assessor to organise a meeting this week Upload Second assessor meeting sheet onto Moodle no later than 22:30 Fri 3 Apr 20 |
| | 28,29 | 6 Apr | Easter Vacation |
| | 30 (S2 wk10) | 20 Apr | Full time project work |
| | 31 (S2 wk11) | 27 Apr | Wed 29 Apr 20 at 16:00: Assessment 3: Final Project Report (60%) submit one electronic copy via Moodle AND one paper copy via Faculty Student Centre Also submit by 16:00 on 29 Apr 20 via Moodle only: Project synopsis (75 words) and FYP Photo competition |
| | 32 (S2 – R) | 4 May | --- |
| | 33 (S2 – A) | 11 May | Assessment 5: Viva, Final Presentation and Poster (20%) all to be completed by Tue 12 May 20 . Submit Poster for printing no later than 22:30 12 May 20 |
| | 34 (S2 – A) | 18 May | --- |
| | 35 (S2 – A) | 25 May | Wed 27 May 2020: Design and project exhibition, vivas with external examiners – this is not assessed but all students to be available on the day |

Please note that there is **no submission for Assessment 4: Student Performance (10%)**

w/c = week commencing, R = Revision, A = Assessment

APPENDIX B

ME40321 unit information derived from:

<http://www.bath.ac.uk/catalogues/2018-2019/me/ME40321.html>

| | |
|------------------------------------|---|
| ① Academic Year: | 2019/20 |
| ① Owing Department/School: | Department of Mechanical Engineering |
| ① Credits: | 30 [equivalent to 60 CATS credits] |
| ① Notional Study Hours: | 600 |
| ① Level: | Masters UG & PG (FHEQ level 7) |
| ① Period: | Academic Year |
| ① Assessment Summary: | CW 100% |
| ① Assessment Detail: | <p>Project Scoping and Planning (CW 5%)</p> <p>Preliminary Project Presentation (CW 5%)</p> <p>Final Project Report (CW 60%)</p> <p>Performance Assessment (CW 10%)</p> <p>Viva, Final Presentation and Poster (CW 20%)</p> |
| ① Supplementary Assessment: | ME40321 Reassessment Coursework (where allowed by programme regulations) |
| ① Requisites: | To be specified by individual project supervisors. |
| ① Description: | <p>Aims:</p> <p>To enable the student to show creativity and initiative in carrying out a demanding investigation or design project within a specific topic area.</p> <p>To enable the student to synthesise information from both within the total course and from external sources.</p> <p>To enable the student to communicate effectively a major piece of project work.</p> <p>To give the student experience in working in a research environment or on an industry based design project.</p> <p>Learning Outcomes:</p> <p>On successful completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> * Plan, organise and conduct an engineering project to meet the requirements of the initial aims. * Present the project work via written documentation and oral presentations. <p>Skills:</p> <p>Problem solving; written communication; oral communication; IT; working independently.</p> <p>Content:</p> <p>The final year engineering projects will either be defined as "Design" or "Research" in content. Whether classified as design or research, projects may be undertaken on an individual or a linked basis. RESEARCH PROJECTS will contain at least 2 of the 3 following elements - analytical, computational, experimental aspects. DESIGN PROJECTS will contain specification, design, analysis, manufacture and test work.</p> |

APPENDIX C

University of Bath, Department of Mechanical Engineering Assessment Criteria and Grade Descriptors for **ME4 units**

| The ME4 units are characterised by an expectation of student's expertise in their specialism. At this stage, students are semi-autonomous; demonstrate independence in negotiation of assessment tasks (including projects) and show the ability to evaluate, challenge, modify and develop theory and practice. They are expected to present an ability to isolate and focus on the most significant features of problems and to offer coherent solutions. | | |
|---|--|---|
| Mark Bands | Core mechanical engineering knowledge | Transferable skills |
| 90-100% | Exceptional analysis of key engineering concepts with very clear originality and autonomy. Exceptional development of novel conceptual structures and argument using scholarly conventions. Demonstrates the highest level of intellectual rigour and consistency; work pushes the boundary of the discipline and should be considered for external publication. | Exceptional research skills making consistent use of scholarly conventions. Highest level of intellectual rigour in deriving novel and creative solutions to problems. Faultless articulation of the findings in a logical, engaging and rigorous manner. Exceptionally creative use of appropriate media for conveying the gained knowledge. |
| 80-89% | Outstanding analysis of key engineering concepts with clear originality and autonomy. Development of novel conceptual structures based on logic and scholarly conventions. Demonstrates a high level of intellectual rigour and consistency; the work touches the boundary of the discipline and may be considered for external publication. | Demonstrating an outstanding level of research skills using scholarly conventions. A very high level of intellectual rigour in solving complex problems. Well-structured articulation of findings in an engaging and logical manner. Creative use of the appropriate media for conveying the gained knowledge. |
| 70-79% | Excellent analysis of key engineering concepts with originality and autonomy. Logical development of complex conceptual structures based on logic and scholarly conventions. Demonstrates intellectual rigour and consistency; the work approaches the boundary of the discipline. | Demonstrating an excellent level of research skills and proficiency in scholarly conventions. A high level of intellectual rigour in solving problems. Structured articulation of findings in an error-free and logical manner. Excellent use of appropriate media for conveying the gained knowledge. |
| 60-69% | Good analysis of engineering concepts with some originality in identifying the most significant issues. Development of non-trivial conceptual structures based on scholarly conventions. The rigour demonstrated in the work is sound. | Structured and mainly accurate expression. Good academic/intellectual skills and team/practical/professional skills. Good use of appropriate media for conveying the gained knowledge. |
| 50-59% | Satisfactory analysis of pertinent engineering concepts. Development of conceptual structures based on scholarly conventions. The intellectual rigour in the work is mostly sound with minor gaps. | Some lack of structure and accuracy in expression. Acceptable academic/intellectual skills and satisfactory practical/professional skills. Acceptable use of appropriate media for conveying the gained knowledge. |
| 40-49% | Shows basic understanding of core engineering concepts with gaps in the knowledge; mostly sound in intellectual rigour but lacking in autonomy and originality. | Some difficulty with structure and accuracy in expression. Mostly acceptable use of appropriate media with noticeable deficiencies in conveyance of knowledge. |
| 30-39% | Demonstrates limited understanding of core engineering concepts with major gaps in the knowledge. Limited intellectual rigour. | Limited use of learning resources. Weak academic/intellectual skills. Practical/professional skills are not yet secure. Some use of appropriate media. |
| 10-29% | Little evidence of understanding of core engineering concepts. | Little evidence of use of learning resources. Very weak academic/intellectual skills and significant difficulties with structure/expression. Little evidence of practical/professional skills. |
| 1-9% | No evidence of understanding of core engineering concepts. | No evidence of use of learning resources of understanding of self-direction. No evidence of academic/intellectual skills and incoherent structure/expression. No evidence of professional skills. |

APPENDIX D. Layout for title page of project scoping, planning and literature review



UNIVERSITY OF
BATH

Department of Mechanical Engineering
FACULTY OF ENGINEERING AND DESIGN

**FINAL YEAR MEng PROJECT
PROJECT PLAN AND LITERATURE REVIEW**

Name of the project

Your name

Date of submission

Image (optional)

A large, empty rectangular box with a black border, intended for an optional image.

Supervisor: *Name*

Assessor: *Name*

APPENDIX E. Layout for title page of final year project report



UNIVERSITY OF
BATH

Department of Mechanical Engineering
FACULTY OF ENGINEERING AND DESIGN

FINAL YEAR MEng PROJECT REPORT

Name of the project

Your name

Date of submission

Image (optional)

“I certify that I have read and understood the entry in the Student Handbook for the Department of Mechanical Engineering on Cheating and Plagiarism and that all material in this assignment is my own work, except where I have indicated with appropriate references.”

Author's signature:

Supervisor: *Name*

Assessor: *Name*