NOTE

Project work for the Bachelor of Science in Integrated Product Design is being co-ordinated by the relevant Director of Studies and Edinburgh College of Art.
INTRODUCTION

All BSc(Honours), BEng(Honours) and MEng students entering 4th Year must undertake a major individual project. The weighting of this project depends upon the course undertaken, as indicated below.

The underlying philosophy of the project is to provide an opportunity for a student to develop his or her capabilities as an individual whilst engaged in an assignment of professional standard. Whilst many practising professional engineers work as members of a team, there are occasions when the success of a project may depend on individual talents together with the ability to assume responsibility in carrying through an idea to successful completion. It is in this respect that the individual project forms an important part of the Honours and MEng programmes.

1.0 PURPOSE OF THE PROJECT
The project is planned with the following aims:
(a) to give the student a realistic exercise in the practice of engineering at professional level;
(b) to provide a vehicle for integrating knowledge gained in several areas of the degree course;
(c) to allow the exercise of the student's personal qualities, e.g. initiative, imagination, creativity, effective oral and written communication;
(d) to provide an opportunity to assess the student's ability under a simulated professional situation;
(e) to enable the student to appreciate the translation of engineering science into solutions to engineering problems.

2.0 FORM OF THE PROJECT
Given that a project may take a variety of forms, it should nevertheless include most or some of the following:
(a) reference to previous work on the topic (or similar), relevant theories or processes, and, if relevant, economic and marketing factors;
(b) modelling and analysis, possibly involving computing;
(c) design and/or manufacture where appropriate;
(d) experimental or investigative phase;
(e) critical interpretation and assessment of work performed;
(f) recommendations resulting from (e);
(g) oral and written communication.

Additional information relating to the form and style of the main project written assessment is given in this booklet.
3.0 GENERAL GUIDELINES

(a) It is the student’s responsibility to apply some form of planning to ensure consistent and efficient use of available time from October through to May. Key tasks and activities should be identified and assigned work periods proportional to their relevance and importance, e.g. literature survey. Simple Gantt charts are a useful guide, if you do not know what this is then you should find out. Look up any project management book in the library or see: www.ganttchart.com

(b) Projects may involve experimental work employing either existing or new rigs. Major modifications to existing rigs or new components requiring manufacture should be dealt with via good, well-annotated drawings. **Such drawings should be scrutinised by your supervisor before release to the workshop to ensure feasibility of manufacture, also talk to the technicians for advice!!!!!** These activities should be performed well before Christmas since during term 2 and the beginning of term 3 you will find that the workshop becomes very busy.

With regard to workshop and laboratory activities, your attention is drawn to the ‘Undergraduate Safety Regulations and Procedures’ booklet issued to all students. **PLEASE NOTE THE RISK ASSESSMENT POLICY. MAKE SURE ACTIVITIES ARE PROPELY RISK ASSESSED – THIS IS A LEGAL REQUIREMENT.**

Risk assessment forms and requisition forms are available on VISION\(^1\), these should be completed as required and countersigned by your project supervisor.

(c) If your project requires consumable items, do not assume that they will materialise out of thin air - discuss with your supervisor and place on order as appropriate as early in the academic year as possible.

(d) Although the projects run from October through to May, a temporary break will occur over the Easter vacation to permit the final examinations in the major synoptic modules (e.g. Strength/Dynamics, Thermo/Fluids, Manufacture) to take place in Week 1 of Term 3. As mentioned in (a), students should plan accordingly.

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\(^1\) Note that communications an information intended for all students will be via vision module B54PA1 (Engineering and Management students will be given access to this module) You should check this regularly.
4.0 LOG BOOKS
It is recommended that students should keep a logbook for the duration of the project, so that all relevant information may be recorded reliably and safely. The logbook will also prove invaluable in the preparation of the final report.

The log book should be preferably a ‘fixed page’ book rather than a loose-leaf folder, and should be considered as a day-to-day work book for the recording of:

- Progress of work
- Results/Findings
- Problems encountered
- Instrumentation data
- Suppliers of equipment
- Meetings with Supervisor
- etc.

5.0 ASSESSMENT
The project has several distinct components having the following weighting:

<table>
<thead>
<tr>
<th>Component</th>
<th>Timing</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BEng</td>
<td>MEng</td>
</tr>
<tr>
<td>Progress Report</td>
<td>All Courses, Term 1 Week 10</td>
<td>5%</td>
</tr>
<tr>
<td>Progress Presentation</td>
<td>All Courses, Term 1 Week 10</td>
<td>5%</td>
</tr>
<tr>
<td>Project Poster</td>
<td>All Courses, Term 2 Week 9</td>
<td>5%</td>
</tr>
<tr>
<td>Major Presentation</td>
<td>BEng, Term 2 Week 9</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>MEng, Term 3 Week 7</td>
<td>15%</td>
</tr>
<tr>
<td>Final Journal Paper</td>
<td>BEng, Term 3 Week 6</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>MEng, Term 3 Week 8</td>
<td>60%</td>
</tr>
<tr>
<td>Future Work Plan</td>
<td>MEng, Term 3 Week 8</td>
<td>10%</td>
</tr>
</tbody>
</table>

Additionally, MEng students will undertake work in parallel with that carried out in B54DP3.

BEng – mark recorded for B54PA1, B54PB2, B54PC3, B54PD3 = Project mark
MEng – mark recorded for:
B54PA1, B54PE2, B54PC3, B54PD3, B54PF3

= 0.8 x Project mark + 0.2 x B54DP3 mark

These components have the following features:

5.1 Progress report
This should be in typescript and should not exceed 500 words approximately. With a cover page and bar chart, the report should not exceed 4-5 A4 pages. The report should be brief and concise with clearly defined objectives plus a short introduction and should relate to the actual progress achieved during Term 1; not only what you hope to achieve in Terms 2 and 3. Write this in 3rd person with section and figure numbers. It should be submitted to your supervisor, who will be solely responsible for assessment, no later than Friday of Week 10, Term 1.
5.2 Progress Presentation
This will be a short talk of 5 minutes’ duration based on your Term 1 activities as outlined in 5.1 above. The audience will comprise both students and staff arranged in several more parallel sessions in order to allow the entire class to present in one afternoon. Simple visual aids, (e.g. Powerpoint, O/H projector) may be used but slides must be kept to a minimum, typically. 2 or 3 well prepared slides will be sufficient.

The assessment for each presentation is based on an average of the marks submitted by all academic staff present. The presentation will be assessed in relation to technical content and general presentation; this is the basis for the 5% component mark.

It is intended to hold the talks in Week 10 of Term 1 - further information will be issued in due course. Make sure you regularly read you e-mail and check vision for updates.

5.3 Project Poster
Each student will produce an A4 colour poster summarising his or her project. These posters are to be brought to the Term 2 Project Presentation Day for display and should be produced in PowerPoint or Micrografx Designer. The best poster designs will then be enlarged to A3 size, laminated and displayed permanently around the department. The best of these will also receive a prize. Note that the poster will constitute 5% of your total project mark.

Students may also be invited to modify their posters for submission to a competition organised by the Royal Academy of Engineering. Posters prepared for this competition will not gain additional marks, but will be eligible for significant cash prizes and prestige – a useful addition to your CV.

5.4 Major Presentation
The major presentation is a project talk occupying a 20-minute slot (depending on final programme) in the presentation programme arranged roughly as follows:

<table>
<thead>
<tr>
<th>Project Talk</th>
<th>15 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Question Time’</td>
<td>3 minutes</td>
</tr>
<tr>
<td>Change over</td>
<td>2 minutes</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20 minutes</strong></td>
</tr>
</tbody>
</table>

As in 5.2, the audience will comprise both students and staff arranged in parallel sessions. Presentations may be accompanied by the use of audio-visual aids, typically, Powerpoint slides, O/H projectors, flip chart, etc.). Any additional aids for your talk must be approved by your supervisor, e.g. video and TV monitor.

The assessment for each presentation is based on an average of the marks submitted by all academic staff present and relates to two broad areas, namely technical content and general presentation; this is the basis for the 15% component mark.

The BEng/BSc presentations will be held usually in Week 9 of Term 2. MEng presentations will take place around Week 7 of Term 3. Further information will be issued in due course. These will be either on-campus or off-campus depending if industrial sponsorship is forthcoming.
5.5 Final Journal Paper
Your final written submission for your project will take the form of a professional academic journal paper in which you should describe your project work, your literature survey, methodology, results, discussion of same and conclusions. There are many examples in the library of how journal papers are structured and written. The format chosen for this is given on Vision (B54PA1) in the form of a template along with an author’s guide and sample paper.

The component mark for the final paper is based on marks awarded by members of staff (supervisor plus 2nd assessor), each of whom will read and assess the paper. The supervisor’s mark is weighted more heavily than the mark from the other assessor, giving a final ‘weighted average’ mark.

The accompanying project marking scheme (Appendix B) is used by all assessors.

A third marker will only be involved if the first two marks differ by more than 20% and the discrepancy cannot be resolved by discussion. Other points are:
1. A mark for each project will be calculated using the formulae shown below. Cases involving three markers will be brought to the attention of the external examiner.
2. When a project has been jointly supervised, the supervisors will be asked to produce a single supervisor's mark.

5.6 The “Future Work Plan”
MEng students will be required to submit, as an annex to their final papers, either:
   A commercialisation proposal
   A research proposal
Depending on the nature of the project.
This will be marked by the supervisor and second marker.
The project supervisor will advise on the Future Work Proposal, but, in general, a commercialisation proposal should include:
   • An estimate of the commercial potential of a product arising from the project
   • The estimate of the cost of a product arising from the project if brought to market
   • Details of the work needed to develop the product to a stage where it may be exploited commercially
while a research proposal would include:
   • A statement of the problem to be addressed
   • A summary of the research methodology to be employed
   • An estimate of the cost of carrying out the research (manpower and equipment)
   • The benefits of carrying out the proposed research
5.7 Formula for determining overall mark

Two Marker Formula
When based on two marks the final mark will be calculated with the following formula:

\[
\text{Final Mark}(\%) = 0.5(T+Pr) + Mp + 0.4\text{Sup} + 0.3\text{Sm}
\]

Where:
- \( T \) = Mark for 1st Term talk (out of 10)
- \( Pr \) = Mark for 1st Term progress report (out of 10)
- \( Mp \) = Mark for major presentation and poster (out of 20)
- \( \text{Sup} \) = Mark for final journal paper (*and future work plan*) by supervisor(s) (%)
- \( \text{Sm} \) = Mark for final report (*and future work plan*) by second marker (%)

Three Marker Formula (BEng and BSc)
When based on three marks the final mark will be calculated with the following formula:

\[
\text{Final Mark (\%) = 0.5 (T+Pr) + Mp + 0.3 Sup + 0.2 Sm + 0.2 Tm}
\]

Where:
- \( T \) = Mark for 1st Term Talk (out of 10)
- \( Pr \) = Mark for 1st Term progress report (out of 10)
- \( Mp \) = Mark for major presentation and poster (out of 20)
- \( \text{Sup} \) = Mark for final journal paper (*and future work plan*) by supervisor (%)
- \( \text{Sm} \) = Mark for final journal paper (*and future work plan*) by second marker (%)
- \( Tm \) = Mark for final journal paper by (*and future work plan*) third marker (%)

*For MEng students the Supervisor and markers will allocate marks for both the paper and future work plan and these will be combined:

\[
\text{Mark (\%) = (0.6 x Paper(\%) + 0.1 x Future work plan (\%)) x 100/70)
\]
6.0 GUIDELINES FOR ORAL PRESENTATION

Prior to a presentation, you should consult your supervisor concerning the structure and content of your material and of the need for any special audio-visual aids. However, your presentation should contain the following essential elements:

- **INTRODUCTION**
  Introduce yourself and the title of the project.

- **OVERVIEW OF PROJECT**
  Brief background history.
  Brief discussion of objectives and activities.
  Outline and discussion of results.
  Summary of results.

- **CONCLUSIONS**
  General conclusions, observations, difficulties encountered, limitations of theory.

- **QUESTIONS**
  Be prepared to answer questions from the audience - this is part of the exercise!

6.1 General Hints/Tips

A Powerpoint presentation is desirable but overheads can be used. However, the following points should be observed:

- Restrict the number of slides/transparencies to a reasonable level, e.g. 1 per 2 minutes of talk, unless your supervisor suggests otherwise.
- Keep the transparencies simple with clear text.
- Use of colour can be advantageous.
- Transparencies are useful as prompts.
- Use a pencil/pen/pointer to highlight items.
- Maintain eye contact with the audience.
- Speak clearly but not too quickly.
- Reading from a script is generally not advised.
- Prompt cards with headings can be useful.

6.2 Courses Available

Students are reminded that the Careers Advisory Service organises short courses in ‘Presentation Skills’ and similar topics, which are aimed at final year undergraduates. These are generally advertised around the University - consult the notice boards.

7.0 Journal Paper

The front cover for your journal paper submission should be structured as shown in Appendix A. You should submit two bound copies of your paper which must have a departmental cover. A third copy should also be handed in which should be loose-leaf and stapled in the top left-hand corner. You should also submit a CD with Word-file copies of the paper and any other information/data/programs/etc. relating to your project.
For BSc/BEng courses all of these should be submitted to the secretarial staff in the Main Office no later than **Friday of Week 6, Term 3**. For MEng courses these should be handed in no later than **Wednesday of Week 8, Term 3**.

*Make sure you receive a signed receipt from the secretary as evidence of submission.*

As a guide, look at journal papers kept in the library. Remember to have an acknowledgements section at the end of your paper, just before the references.
Appendix A

Final Year Honours Project
for the degree of
B.Eng. in Mechanical Engineering

Journal Paper

C. J. Seath

Computerised Mechanism Analyser

May 2005

Project Supervisor: Mr. I. Black

School of Engineering and Physical Sciences
Mechanical Engineering
Appendix B - Heriot Watt University – Mechanical Engineering – Project Marking Scheme.

<table>
<thead>
<tr>
<th>CATEGORY (WEIGHTING: 100)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>LITERATURE REVIEW (20)</td>
<td>Has identified the relevant literature and previous work and theory relevant to the project. Appropriate referencing critically reviewed.</td>
<td>Has identified most of the relevant literature and previous work and theory relevant to the project. Appropriate referencing, most critically reviewed.</td>
<td>Has identified an acceptable proportion of the relevant literature and previous work and theory relevant to the project. Some appropriate referencing, most critically reviewed.</td>
<td>Has identified some relevant literature and previous work and theory. Some referencing discussed.</td>
<td>Has identified a limited number of examples of relevant literature and previous work and theory.</td>
<td>Has NOT identified sufficient examples of relevant literature or previous work or theory.</td>
</tr>
<tr>
<td>FORMAT/PRESENTATION (20)</td>
<td>Excellent use of formatting, graphs, images, equations etc. Clearly presenting all ideas/results/principles. Excellent grammar and spelling with appropriate academic written style.</td>
<td>Very good use of formatting, graphs, images, equations etc. Clearly presenting most ideas/results/principles. Very good grammar and spelling with appropriate academic written style.</td>
<td>Good use of formatting, graphs, images, equations etc. Clearly presenting some ideas/results/principles. Good grammar and spelling.</td>
<td>Some use of formatting, graphs, images, equations etc. Presenting some ideas/results/principles. Poor grammar and some spelling mistakes.</td>
<td>Poor use of formatting, graphs, images, equations etc. Difficult to understand some ideas/results/principles. Parts missing or wrongly presented. Poor language and grammar and some spelling mistakes.</td>
<td>Very poor presentation using inappropriate methods which fail to present the ideas/results/principles involved. Language, grammar and spelling poor.</td>
</tr>
<tr>
<td>TECHNICAL CONTENT (30)</td>
<td>Has correctly applied the ideas/principles and interpreted results.</td>
<td>Has correctly applied most of the ideas/principles and interpreted results.</td>
<td>Has correctly applied an acceptable proportion of ideas/principles and interpreted results.</td>
<td>Has correctly applied some of the ideas/principles and interpreted some results.</td>
<td>Has applied some of the ideas/principles in some cases.</td>
<td>Has shown little/no evidence of application of ideas/principles and/or interpretation or results.</td>
</tr>
<tr>
<td>CRITICAL EVALUATION (30)</td>
<td>Excellent extensive critical evaluation and analysis and discussion within project. Rigorous and appropriate analysis.</td>
<td>Excellent critical evaluation and analysis and discussion within project. Generally rigorous and appropriate analysis.</td>
<td>Some critical evaluation and analysis and discussion. Rigor in analysis could be greatly improved.</td>
<td>Little critical evaluation or analysis or discussion. Analysis not rigorous.</td>
<td>Miseducated critical evaluation/analysis within assignment. Poor discussion. No rigor.</td>
<td>Lacking critique and rigour.</td>
</tr>
</tbody>
</table>