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MSc Project (ENG5059P) Project Guidelines

Session 2022–2023

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IMPORTANT DEADLINES – MSC PROJECTS

Event	Deadline
Project lists	Available to view in February
Project selection and Allocation form	Allocation will be completed in mid-April.
Preliminary work on project	Preliminary project work (e.g. background reading, software familiarisation) will commence from the end of Semester two examinations
Project outline document / Preliminary report	To be submitted to and agreed with your supervisor by 12 noon on Friday 16 June 2023. Please upload the **agreed** document to Moodle.
Project starts	Monday 22 May 23
Project poster submission	**Deadline for submission of electronic version of poster is 12 noon on Tuesday 08 August 23** Poster format: A1 portrait only (**formatted ppt template can be found on the MSc Project Moodle page**) Please save as a **pdf** file after all data and images have been added to the ppt template and then submit via Moodle)
Poster submission for free printing	If you wish free printing of your poster for the poster presentation event, please email your A1 pdf file to eng-teachingoffice@glasgow.ac.uk by **12 noon on Tuesday 1 August**. Please note: The poster **MUST** be the same version that you upload on 08 August 23 to Moodle
Written report	Deadline for submission of project report is **12 noon on Monday 14 August 23** (Electronic copy to Moodle). **Please use the project report front cover that can be found on the MSc Project Moodle page).**
Poster presentation	Wednesday 16 August 23 – Venue and date to be confirmed. (STUDENTS MUST PLAN TO ATTEND THIS EVENT)

SUMMARY OF SUBMISSION DEADLINES

Please see above table for relevant submission information

Event	Deadline
Project outline document / Preliminary report	12 noon on Friday 16 June 2023
Poster submission for free printing	12 noon on Tuesday 1 August 2023
Project poster submission	12 noon on Tuesday 08 August 2023
Written report	12 noon on Monday 14 August 2023
Poster presentation event	09:30 - 16:00 on Wednesday 16 August 2023 **(TBC)**

Note: Students following programmes taught jointly with other institutions (Product Design Engineering - Glasgow School of Art) may have other deadlines to those given above. These students should be guided by their programme coordinators.

PROJECT SELECTION AND ALLOCATION

Projects for students on the taught postgraduate MSc programme can be selected in two ways:

- from a list, associated with your degree programme, available online early in Semester 2
- by asking a lecturer with appropriate knowledge if they'll supervise a project of your conception

However the project is selected, it must be approved by the MSc Project Co-Ordinator to ensure that it meets the learning outcomes associated with the project.

Also, be aware that staff can only supervise a limited number of projects and you might not get your first choice from the project list, so the sooner you start the selection process the better.

Every effort is made to allocate the first-choice project to each student and if that has already been allocated to another student, to try to allocate their second choice and so on. If several students all desire the same project, it is allocated to the student with the highest GPA from the December exam diet. For January start students, where no GPA information is available, a nominal value of GPA will be used. This is the fairest possible approach.

Unfortunately, no method can guarantee that all students will be allocated a project from their selected list. It may be the case that you have been unlucky in that all your selected project titles have already been allocated to other students. In that case, you will have been allocated a project from the remaining pool of titles staff have identified as suitable for your course. Again, there is no fairer way to perform the allocation.

If, after all these steps have been taken you are still unhappy about the project allocated to you, there is the option to discuss the project structure with your supervisor or with the discipline specific MSc project co-ordinators listed below:

Aerospace: Dr Hossein Zare Behtash
BME: Dr Sean McGinty
Civil: Dr Peter Grassl
EEE: Prof. Martin Lavery
EEE: Prof. Vihar Georgiev
Mechanical: Dr Steven Neale

While there is no guarantee that changes can be made to your satisfaction, staff and local project co-ordinators will try to help.

The selection and allocation process will be supported by the School project database software. Details of how to access the software will be made available via email.

CONDUCTING YOUR MSC PROJECT

It is very important that you put sufficient time into your project early in the project. This is especially important if you depend on facilities or software that are heavily used by other people. Careful planning is essential. You are expected to show initiative and work fairly independently on your project, and should not expect the supervisors to tell you what to do all the time. Before writing your preliminary report agree your project objectives with your supervisor. These must indicate the expected outcomes of the work: your project will be assessed against how well you achieve these outcomes. Then write a short outline of your project (this is your preliminary report). The contents must be agreed with your supervisor before commencing detailed work. It must include:

- the objectives
- a brief description of the project and its background
- a Gantt chart identifying the main tasks and a schedule for carrying these out
- resources needed, when they are required and how they'll be obtained.
- an initial list of key references

Your project is to be an individual effort but with some projects it would be unrealistic to expect one student to achieve the aim in one year. You may therefore be required to collaborate with others working towards the same aim. If this is the case, your supervisor will allocate individual work packages, each with its own objectives.

Please remember that you are expected to work full-time on your project from the end of May until the end of August. During this period, you are normally expected to have meetings with your supervisor every one or two weeks. In addition, you are encouraged to keep a record of your work in a Lab Book, which should be discussed with your supervisor during your meetings. You should also be aware that your supervisor will likely be taking some annual leave over the summer months and this should enter into your planning.

If you require a Tier 4 visa to complete your MSc studies, please be aware the that that University are obliged to confirm that you are engaged with studies and meeting regularly with your first supervisor.

HOW TO WRITE A TECHNICAL PROJECT REPORT

Abstract

All reports start with an *abstract*, which contains a summary of the project: its aim, what was done and what was achieved. This document describes the requirements for an MSc project report in the School of Engineering and gives advice on how to get better marks. It is structured to match a project report as far as possible.

Contents

1 Introduction

2 Body of the report

3 Discussion

4 Conclusions

References

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1 Introduction

Whew – I've finished the work, now I only have to write the report. Sound familar? Many students put off writing until too late and don't leave enough time to make a good job of the report. This is a serious mistake because the report typically accounts for a large fraction of the assessment. Start early – most people find report-writing difficult. Think about the report throughout your project, keep track of references and collect material to illustrate the report.

1.1 Mechanical aspects

The length of the body of the report will be specified in the instructions for the project (for MSc project about 40-50 pages, approximately 10,000 to 15,000 words). Extra material may be provided in appendices but this material should be for reference only: you cannot assume that the reader will study it. In other words, do not put vital points in an appendix.

You will probably think that the report is too short but this is deliberate. Most reports are submitted to busy managers, who do not have time to read lengthy documents. It is important to learn how to pick out the vital points and write a concise report with maximum impact.

Reports should be word-processed and submitted electronically. Use A4 pages and a clear typeface such as 12-point Times, single line spacing, number the pages and leave margins of at least 25 mm all round. Follow this layout (this document breaks some of the rules to keep it compact).

- The front cover should show the title of the project with your name(s) and matriculation number(s) and the name of your supervisor(s).

- Put the abstract on the next page. It should be about 100–250 words and gives a brief summary of the report including the background and aims of the project, the principal results and conclusions.

- The next page should show the table of contents.

- The body of the report should be divided into numbered sections, each starting on a new page. Figures (diagrams, plots or photographs) and tables need captions and should be numbered.

1.2 What goes into the introduction?

Explain the background to the project and the reasons why your particular piece of work was considered worthwhile. This leads to the **aims** of the project: what you are trying to achieve. Be specific.

2 Body of the report

2.1 Structure and sections

The structure of the report and the titles of sections depend on the nature of the project. Here are suggestions for two extreme types, which can be adjusted to suit your report.

Research projects

Here you are given a starting point and a general direction: your aim is to discover something new. The report would probably be divided into sections with familiar titles.

- **Theory** – Explain essential background theory that is vital to understand your report. Select and present the material to show its relevance to the project and demonstrate your understanding. Do not repeat standard material from textbooks, which is a waste of space; give a reference instead.

- **Experimental Techniques** – Give an account of your experimental (or numerical) techniques. Emphasise details that would be necessary to continue the work or to compare your results with those of other experimenters. Aim to include what you would have liked to know at the start of your project.

- **Results** – Describe these at an appropriate level of detail to support your conclusions. Lengthy tables should be left to an appendix or supplied in a separate data file. Avoid unnecessary detail: describe preliminary experiments briefly if at all, unless they illustrate some important point.

Design, build and test projects

Here the goal is specified, more or less precisely: your job is to work out how to get there. The titles of the sections are less standardised but here is a possible approach.

- **Specification** – Typically you are given only a vague description of the functions required and must first develop this into a firm specification against which your final product will be judged.

- **Possible strategies** – Evaluate *briefly* the possible approaches that you considered and explain why you selected one of these. Avoid excessive detail of discarded possibilities.

- **Implementation** – Describe the final product. Concentrate on key features that required advanced design and skim over well-known aspects. Mention useful points that might help future students, such as tricky sections of data sheets.

  Software is tricky. Often the best approach is to describe the high-level structure in the main text (a diagram of a state machine for example) and pick out any special features of the program. A complete listing should be included as an appendix or uploaded separately.

- **Testing** – This is equivalent to the ‘Results’ section of a research project.

2.2 Style of writing

One of the most difficult aspects of writing is to judge the level and background of your readers. Typically the report will be assessed by your first supervisor, who is an expert on the topic, and your second supervisor, who is not. You should therefore assume that the reader is a *well- educated, graduate engineer* but not an expert on the subject of the project. Assume that he or she is familiar with the general concepts taught in courses up to level 3 but not with the details of specialised courses at higher levels.
It is also difficult to appreciate that most readers are not interested in the nitty-gritty detail. They want to know *what* you did and *why* you did it that way but they don't want a step-by-step account of *how* you did it. Your watchword should therefore:

SUMMARISE!

Of course some people need the details – a person continuing work on the project requires precise experimental methods, for instance. Such material may be better in an appendix. The same is true for computer programs and schematics of complicated circuits. Design-and-build projects may need a User's Manual, which should be included as an appendix.

A report is a formal document and should be written in appropriate language. Numerous books offer advice on writing reports and a selection [1, 2, 3, 4] is listed in the references at the end. Here are a few tips.

- Reports should be written in correct English. Break text into paragraphs, keep sentences to a reasonable length and insert appropriate punctuation. Use a spell-checker and a grammar-checker if desired but neither is a substitute for careful reading.

- A report is not a story. Write 'The voltage was measured' rather than 'I measured the voltage'. This document contains instructions and therefore uses a different style.

- Define all abbreviations when they are first used: 'The accelerometer uses a serial peripheral interface (SPI)'. Provide a list of abbreviations if you use a large number of them.

- Don't write material that you don't understand. It will be obvious to the reader.

The quality of English is assessed as part of the report. Foreign students may feel this to be a burden but part of their education in this country is to learn to work effectively in an English-speaking environment.

2.3 Precision

An engineering report must be precise. This applies both to the language and to numerical values. For example, the words *precision* and *accuracy* are often used interchangeably in non- technical discussion but the distinction between them is vital in engineering.
Quote numerical results to an appropriate number of significant figures. For example, it is pointless to claim that a length was 12.345 mm if it was measured with a pocket ruler. Don't simply write down all the digits displayed on your calculator.

Analyse the uncertainties in your results to increase the impact of your results. Please avoid horrors like this:

> The gain was quite accurate.

The sentence is meaningless and the reader will doubt whether you have any idea of the accuracy. Contrast this sentence:

> The accuracy of the gain was estimated to be ±2%, limited by the tolerance of the resistors. A detailed analysis is given in Appendix C.

This is informative and convinces the reader that you have a full understanding.

2.4 Figures and tables

Figures and tables must have informative captions and be numbered as in Figure 1 below. Axes of graphs should have scales, titles and units, otherwise the plot is meaningless. All text must be legible, roughly the same size as the main text. Be warned that plots from Excel need extensive editing to bring them up to an acceptable standard. Oscilloscope screenshots can make good illustrations and are simple to capture on modern equipment.
Tables must have appropriate headings with units. Avoid lengthy tables: consider whether a graph would be clearer or the data would be better in a separate data file.

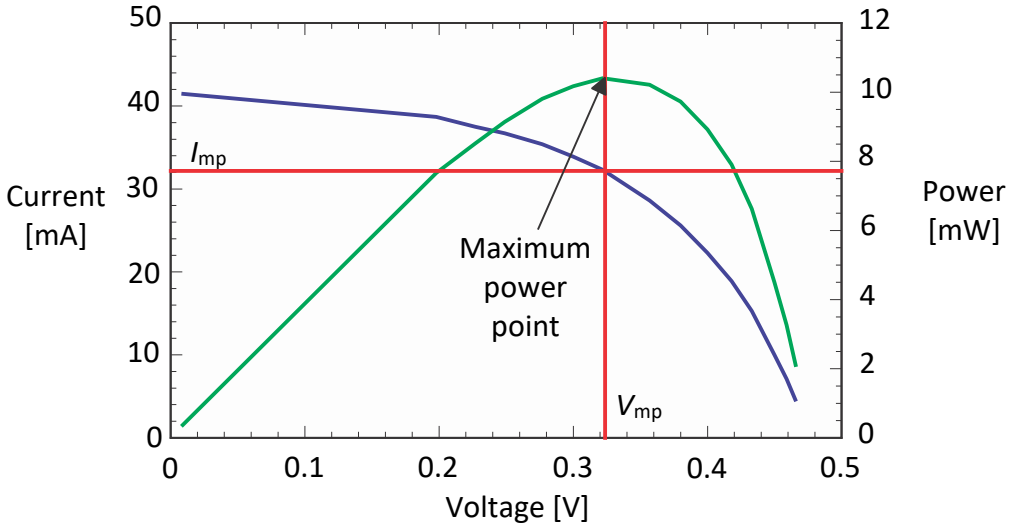

Figure 1 Current and power as a function of voltage delivered by a single photovoltaic cell under illumination from a 150 W metal halide floodlamp, showing the maximum power point.

2.5 References

No project is done in isolation. A research project builds on the results of previous workers; a design-and-build project depends on the properties of the components available. You therefore draw on published documents during your project and must provide *references* to these sources in your report. References are cited (a) to give due credit to the originator and (b) to guide a reader who wants more detailed information. You should give a reference wherever it is required for either of these purposes. Properly referenced material from many sources is a sign of a good project report.
References must be cited with sequential numbers in square brackets where they are used in the text, not just listed at the end of the report. Typical usage is 'Fitzmaurice and Hand [5] showed that. . . ' or 'The median is an appropriate estimator for this signal [5]'.

Avoid direct quotations from references in general; make it absolutely clear that the text is a quotation if this is unavoidable. An illustration, such as a diagram from a data sheet, is another type of quotation and must be referenced, typically in the figure caption. This is perfectly acceptable: do not waste time redrawing diagrams.

Plagiarism

If you copy from another person's work (project report, book, journal, web page or any other document) without acknowledging the source, you are guilty of *plagiarism*. This is a disciplinary offence and the University has procedures for handling it. The failure to acknowledge a source is considered as plagiarism even if there was no deliberate intention to cheat.
Avoid any risk of plagiarism by providing a reference for all sources that you use. Read the advice offered by the University Library and consult your supervisor if you are in any doubt. The University's *Plagiarism Statement* is reproduced in Appendix B on page 13.

List of references

All reports must have a section entitled 'References' after the main text but before any appendices. This comprises a list of references, numbered to match the citations in the text. Each reference requires the following information and the cited references provide examples.

- **Journal paper**: author(s), title of paper, name of journal, volume number, first page, last page and year [5]. Many journals now use article numbers instead of page numbers.
- **Book**: author(s), title, edition, publisher and year of publication [1]. Include the number of the chapter or page(s) if you refer to only a small part of the book.
- **Data sheet**: company, title, edition and date [6]. Application notes, technical reports and similar documents should be cited in the same way.
- **Web page**: author(s) or organisation, title, full URL and date of viewing [7]. See below.

The reader must be able to find the document without searching for further information.

References from the Web

The World Wide Web is a wonderful resource because it is so easy to search. It is therefore tempting to use web pages as references. *Proceed with caution* because the accuracy of many web sites cannot be verified. This is particularly true for anonymous sites such as Wikipedia. Use them only as a starting point: good pages provide references to more authoritative sources.
Reports whose references are all or mainly from the web, especially from anonymous sites, will be penalised.

3 Discussion

The discussion is your opportunity to impress an expert with your depth of understanding. Don't worry so much about the non-expert reader – she or he can skip to the Conclusions.
For a research project this section should provide a logical argument leading from the experimental observations to the final conclusions. Evaluate your results thoroughly and gain every possible piece of understanding from them. Compare the results in detail to other work in the field. This should be a *critical* comparison so don't just say that your results are different from previous work; explain *why*. Never say 'The results were as expected' unless you have already described exactly what was expected!
The main purpose of the Discussion in a design-and-build project is to assess the performance of your product against the specification, showing its strengths and weaknesses.

4 Conclusions

Every report must have conclusions, built on the discussion. This section includes a summary of the main achievements of the work but is more than that. The noun 'conclusion' can be defined as 'a judgement or decision reached by reasoning' [8] so you should highlight what has been learnt as a result of your project. What is the big picture that the reader should take away?

The Conclusions should include an assessment of the outcome against the original aims of the project. If you were unable to fulfil some aims, explain why. It is also useful to re- view the project plan (which should be included with the report). Did some tasks prove to be unexpectedly difficult, for instance?

Suggestions for further work

Almost every project leaves you with ideas for the future. Research typically answers some questions while opening new ones; by the end of a design-and-build project you may have thought of a superior approach. Examiners are impressed by intelligent suggestions for further work because they show that you really understand the project. It is often a sign of strength to identify the weak points and suggest solutions for them.

References

[1] Joan van Emden, *Writing for Engineers*, 3rd Edition, Palgrave Macmillan (2005).

[2] Marun K. Mitra, *Effective Technical Communication: A Guide for Scientists and Engi- neers*, Oxford (2006).

[3] David F. Beer and David McMurrey, *A Guide to Writing as an Engineer*, 3rd Edition, Wiley (2009).

[4] Trevor M. Young, *Technical Writing A–Z: A Commonsense Guide to Engineering Reports and Theses*, American Society of Mechanical Engineers (2005).

[5] G M Fitzmaurice and D J Hand, *A comparison of two average conditional error estimators*, Pattern Recognition Letters, **6**, 221–228 (1987).

[6] Freescale Semiconductor, *Datasheet for MC9S08QG microcontroller*, revision 4 (2008).

[7] Morgan Advanced Ceramics, *Advanced Ceramics: Silicon Nitride*, http://www.morgantechnicalceramics.com/mtc_materials/silicon_nitride.htm (viewed 2009 May 13).

[8] Oxford University Press, *AskOxford*, http://www.askoxford.com/?view=uk (viewed 2009 May 13).

'Conclusion' is defined as (1) an end or finish, (2) the summing-up of an argument or text, (3) a judgement or decision reached by reasoning or (4) the settling of a treaty or agreement.

A. Appendices

Use appendices for supporting material which is relevant but of a detailed nature. In this way the flow of ideas in the body of the report is not interrupted. Appendices are usually lettered rather than numbered to distinguish them. Several uses for appendices have been suggested already but bear in mind that a separate data file may be more appropriate for large tables of results, long programs and data sheets or other background information. Appendices are not included in the word count because the assessors are not obliged to read them. Do not put vital points here!

Include your project plan and interim reports as appendices.

B. UNIVERSITY'S PLAGIARISM STATEMENT (TAKEN FROM SECTION 32 OF THE UNIVERSITY CALENDAR)

The University's degrees and other academic awards are given in recognition of a student's personal achievement. All work submitted by students for assessment is accepted on the understanding that it is the student's own effort.

Plagiarism is defined as the submission or presentation of work, in any form, which is not one's own, without acknowledgement of the sources. Plagiarism includes inappropriate collaboration with others. Special cases of plagiarism can arise from a student using his or her own previous work (termed auto-plagiarism or self-plagiarism). Self-plagiarism includes using work that has already been submitted for assessment at this University or for any other academic award.

The incorporation of material without formal and proper acknowledgement (even with no deliberate intent to cheat) can constitute plagiarism. Work may be considered to be plagiarised if it consists of:

- a direct quotation;
- a close paraphrase;
- an unacknowledged summary of a source;
- direct copying or transcription.

With regard to essays, reports and dissertations, the rule is: if information or ideas are obtained from any source, that source must be acknowledged according to the appropriate convention in that discipline; and any direct quotation must be placed in quotation marks and the source cited immediately. Any failure to acknowledge adequately or to cite properly other sources in submitted work is plagiarism. Under examination conditions, material learnt by rote or close paraphrase will be expected to follow the usual rules of reference citation otherwise it will be considered as plagiarism. Schools should provide guidance on other appropriate use of references in examination conditions.

Plagiarism is considered to be an act of fraudulence and an offence against the University Code of Student Conduct. Alleged plagiarism, at whatever stage of a student's studies, whether before or after graduation, will be investigated and dealt with appropriately by the University.

The University reserves the right to use plagiarism detection systems, which may be externally based, in the interests of improving academic standards when assessing student work.

ASSESSMENT OF YOUR MSC PROJECT

Overview

MSc Projects are assessed on the basis of a written project report (60%), your conduct of the project (20%) and the production and presentation of a Project Poster (20%). The Report and Poster must be submitted by all students by the defined deadlines (see table above).

Written report
There are no strict limits to length of the report though as guide you should consider about 40-50 pages (approximately 10,000 to 15,000 words[1]) as being about right. Appendices are additional to this guideline.

An electronic version of the report must be submitted as a PDF document on the Moodle page and checked using the plagiarism software.

Your written report will be graded by your supervisor and moderator according to the *MSc Project Report Marking Guide*.

[1] Please note that these word lengths are estimates based on 250 – 300 words per page. It should not be taken as a strict measure of your dissertation.

MSc PROJECT MARKING GUIDE

PROJECT REPORT, CONDUCT & POSTER MARKING GUIDE

OVERVIEW

PGT MSc Projects will be assessed on the basis of a written report/dissertation (60%), conduct throughout the project (20%) and a poster presentation (20%).

Written report

Supervisors are asked to assess both the *written report* and the overall *conduct of the project*, based on their knowledge of the student throughout the project. In addition, the supervisor will assess the poster presentation.

Moderators are asked to assess the written report and poster independently of the supervisor. Each criterion on the marking grid should be considered and then personal judgement used to assign an overall grade using the University Code of Assessment and the supplementary guidance notes supplied.

Staff will not make any allowance for medical circumstances when marking the report. These will be considered at the exam board, when raised by the appropriate adviser of studies.

Written reports will go to the appropriate Head of Discipline (HOD), or their nominated representative, for arbitration if:

- the overall grade is 20 (A3) or higher
- there's a big difference between the supervisor's and moderator's grades
- the supervisor and moderator can't agree a grade
- there are special circumstances that affect the outcome of the project.
- The overall grade is 8 (E1) or lower

In such cases, the HoD will decide a grade for the report and tell the external examiner which reports have been the subject of arbitration. A supervisor unable to agree to the HoD's grade can request a meeting with the external examiner and the Convener of postgraduate taught programmes to resolve the issue prior to the external exam board.

Project Poster

Each poster will be presented at the Poster Conference and assessed by the project supervisor. Each criteria on the marking grid should be considered and then personal judgement used to assign an overall grade using the University Code of Assessment and supporting notes.
Staff will not make any allowance for medical circumstances when assessing the poster. These will be taken into account at the exam board, when raised by the appropriate adviser of studies.

CODE OF ASSESSMENT

level of attainment	percent	score	grade	descriptor	indicated degree
Exemplary range and depth of attainment of intended learning outcomes, secured by discriminating command of a comprehensive range of relevant materials and analyses, and by deployment of considered judgement relating to key issues, concepts and procedures	>83.4	22	A1	excellent	1st
	>79.4	21	A2		
	>76.4	20	A3		
	>73.4	19	A4		
	>69.4	18	A5		
Conclusive attainment of **virtually all** intended learning outcomes, clearly grounded on a close familiarity with a wide range of supporting evidence, constructively utilised to reveal appreciable depth of understanding	>66.4	17	B1	very good	2/1
	>63.4	16	B2		
	>59.4	15	B3		
Clear attainment of **most** of the intended learning outcomes, some more securely grasped than others, resting on a circumscribed range of evidence and displaying a variable depth of understanding	>56.4	14	C1	good	2/2
	>53.4	13	C2		
	>49.4	12	C3		
Acceptable attainment of intended learning outcomes, displaying a qualified familiarity with a minimally sufficient range of relevant materials, and a grasp of the analytical issues and concepts which is generally reasonable, albeit insecure	>46.4	11	D1	satisfactory	3rd
	>43.4	10	D2		
	>39.4	9	D3		
Attainment **deficient** in respect of specific intended learning outcomes, with mixed evidence as to the depth of knowledge and weak deployment of arguments or deficient manipulations	>36.4	8	E1	weak	fail
	>33.4	7	E2		
	>29.4	6	E3		
Attainment of intended learning outcomes **appreciably deficient** in critical respects, lacking secure basis in relevant factual and analytical dimensions	>26.4	5	F1	poor	
	>23.4	4	F2		
	>19.4	3	F3		
Attainment of intended learning outcomes **markedly deficient** in respect of nearly all intended learning outcomes, with irrelevant use of materials and incomplete and flawed explanation	>14.4	2	G1	very poor	
	>9.4	1	G2		
No convincing evidence of attainment of intended learning outcomes, such treatment of the subject as is in evidence being directionless and fragmentary		0	H		