
Final Year Project Guidelines

Mechanical Engineering Department

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Revision History

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01	Oct. 2004	Initial Release	R. Hamade
02	Oct. 2005	Re-formatting and grading	M. Darwish
03	Sep. 2006	Modified deliverables and FYP selection guidelines	A. Shihadeh
04	Oct. 2006	Due dates changed	D. Asmar
05	May 2010	Update to reflect ABET requirements	M. Darwish

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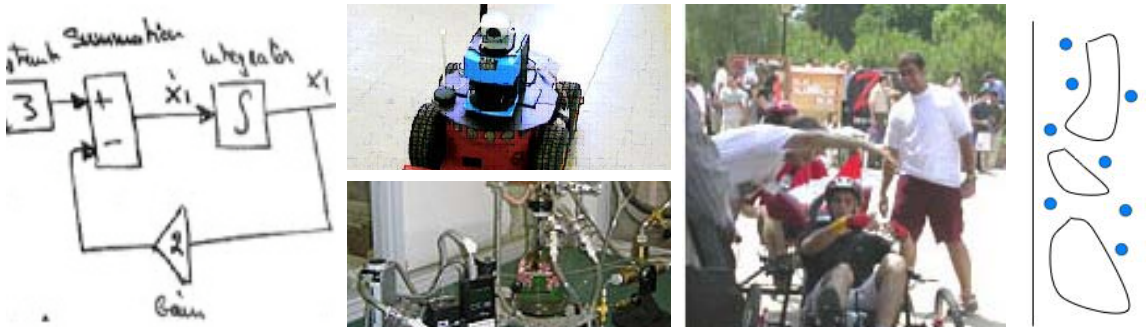
Brief

Timeline for MECH 502

Date	Item	Grade %
March 24	Interim Report	15
May 17	Technical Poster Submission	5
May 19	Final Report	20
May 19-20	FEASC Conference	
May 21	Demonstrations	20
May 24-25	Formal Presentation	15

Introduction

WHAT IS A FINAL YEAR PROJECT



Final year projects from the 2004-05 academic year

The two-semester, final year project will be one of the most important parts of your undergraduate studies. It will also be one of the most time-consuming, taking up many hours over a two-semester, 22-week period. Why is this activity so important that it is worth spending all this time, and why is it a required part of the ME undergraduate program? The answer is that Mechanical Engineering is both a theoretical and an empirical, hands-on discipline, and there are many skills that simply cannot be taught in the classroom. They can only be learned through practical experience—that is, working on a large project that exposes you to some of these important ideas, such as:

- * *Working effectively as part of a team.* For this project you work in teams of 2-3 students. You divide up the tasks, monitor the work of each person, and integrate these individual efforts into a single package. In the “real world” products are rarely, if ever, developed alone, so learning to be an effective part of a development team is an important learning experience.

- * *Developing prototypes and Performing Research.* Building prototypes is a common task in development. Users are often unable to express their needs without seeing a working model. In class there is rarely enough time to develop both a prototype and a fully functional product. However, for the final year project you will build a working prototype of your product. You will also have the opportunity to carry on a fully fledged research project.

- * *Improving your writing and oral presentation skills.* Two fundamentally important parts of the project are the written documents you produce and the oral presentations you give. At the end of the Fall Semester you will deliver

an *Interim Report* and demonstrate your prototype. At the end of the Spring Semester you will produce a *Final Report* and give a presentation of the finished system.

The Final Year Project is a chance to put into practice the concepts that, until now, have been studied formally. By the end of a successfully executed project you will have demonstrated that you have the capability to put into practice what you learned in the ME program, at a level that would be expected of a beginning mechanical engineer

FYP in the context of ABET 2000

The ME Department is in the process of applying for accreditation from the Accreditation Board for Engineering and Technology (ABET). This course will help meet ABET's 2000 Criterion 3. This criterion requires that engineering programs must demonstrate that their graduates have the following attributes:

- 1 Ability to apply knowledge of mathematics, science, and engineering.
- 2 Ability to design and conduct experiments, as well as to analyze and interpret data.
- 3 Ability to design a system, component, or process to meet desired needs.
- 4 Ability to function on multi-disciplinary teams.
- 5 Ability to identify, formulate, and solve engineering problems.
- 6 Understanding of professional and ethical responsibilities.
- 7 Ability to communicate effectively.
- 8 Broad education necessary to understand the impact of engineering solutions in a global/societal context.
- 9 Recognition of the need for, and an ability to engage in life-long learning.
- 10 Knowledge of contemporary issues.
- 11 Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

DESIGN CONSTRAINTS

List any design constraints that must be addressed by the students. Constraints may address political, social, economic, environmental, ease of manufacture, ergonomic, technical or other factors. Constraints should be detailed and specific to the project at hand, not generic. For example:

The elevator brake design must incorporate at least two safety redundancies in the event that the primary mechanism fails.

The bill of materials required of the final design must cost less than \$300 when purchased over-the-counter in Beirut at the time of the project's completion.

At least 50% of the mass of the vehicle must be derived from recycled materials.

STUDENTS ROLES

Define domains of expertise for which each team member will be responsible in the execution of the project. Design projects inevitably require expertise from more than one domain or discipline (e.g., mechanics, heat transfer, vibrations, biology, ergonomics, numerical methods, chemistry, marketing, etc). Students are supposed to experience working on a team in which each member plays the role of the “expert” in one or more domain or discipline. This is different from having a group work on a multi-disciplinary project without specific assigned roles.

Project Schedule

TIMELINE

The following recommended schedule for the Fall and Spring semesters was prepared assuming a “typical” FYP. Use this plan to help you plan your work. Remember that at the end of this academic year, your FYP must reflect the product of about 9 months of dedicated labor by a team of 3-4 junior engineers; it can’t be executed satisfactorily in a series of overnight work episodes a few weeks before the due date. While you may find that your FYP does not adhere exactly to this plan, note that the assignments listed in bold type must be submitted on the dates specified in the “Due dates at a glance” section at the beginning of this report.

Fall semester

- | | |
|------------|--|
| Week 1 | Form a team of 3-4 persons that you will work with on your FYP. |
| Week 3 | Inform the ME Department of your preferred FYP projects by submitting a completed FYP Team and Project Preference Registration Form by the specified deadline. |
| Weeks 5-10 | Perform exhaustive literature/patent/personal contact searches as well as brainstorming sessions in order to understand, define objectives, and properly size the scope of work. |
| Week 11 | Develop preliminary project/product specification & requirements. Get feedback on this from your advisor. |
| Week 12 | Prepare a preliminary hardware Part's List or bill-of-materials (BOM) or any other necessary tools necessary to conduct your work. Estimate project cost. If needed, and in cooperation with advisor(s), secure sponsorship/funding from off-campus bodies.

Consider placing purchase orders for any or all long-lead items/components/tools identified. |
| Week 13 | Upload to the FYP Moodle website a project proposal (PR) which <ul style="list-style-type: none">• contains a complete description of the problem statement• contains a critical literature review (see Project Report Guidelines below)• contains a detailed project schedule and work plan (Develop a detailed schedule laying out all identified tasks, task duration, task division of labor, scheduled meetings, deadlines, milestones, and deliverables.)• states up-to-minute progress• demonstrates a good grasp of your project and proves that your proposed solution is likely to meet specification/requirements |

The proposal is worth 50% of your grade in the Fall semester. It must be uploaded by the deadline specified in the "Due dates at a glance" section above. Late proposals will be penalized 10% per day.

- Week 14 Hold a formal presentation (P1) with project advisor(s) and teammates to defend this proposal. The presentation is worth 25% of your grade in the Fall semester. The remaining 25% of the grade is based on the primary advisor's evaluation of the individual students (SP1).

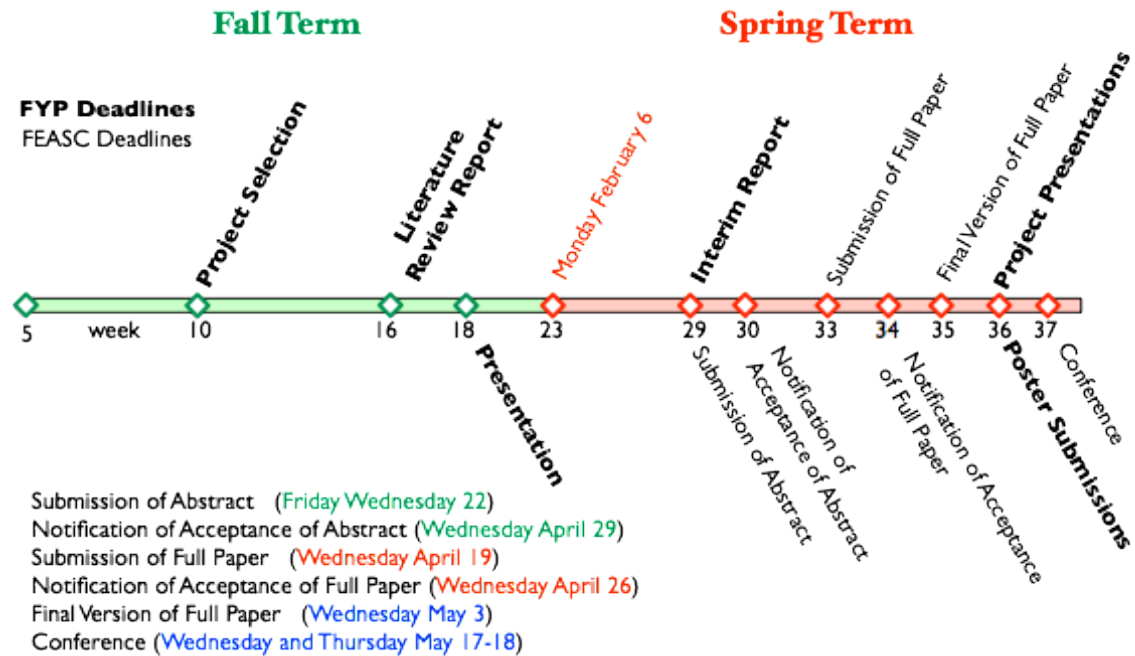
Spring semester

- Weeks 1-6 Methodically and diligently begin executing detailed tasks per your proposal remembering that teamwork is of the essence. In the process, refine the project specifications / requirements if needed. Maintain regular contact with your project advisor(s).
- Week 6 Upload your interim report (R1) to the FYP Moodle website by the specified date. This is a check point to make sure that work is on track and pace. This deliverable along with the progress of the individual student up to this point (SP2) adds up to 20% of the final score. Late interim reports will be penalized 10% for each day delay.
- Weeks 6-9 Based on your advisor(s) input on your interim report, adjust your project actions to make sure you are on the correct path and pace. Proceed to complete tasks diligently.
- Week 9 Demonstrate close to final results to your project advisor(s).
- Week 10 Start writing your final report.
- Weeks 11-12 Tie-up the loose ends. Test, evaluate, integrate, proto build, or otherwise prove and demonstrate final results.
- Week 13 Finish writing and submit your final report (R2) by the published deadline. This date must be strictly adhered to; students who are late in submitting their reports will be penalized 5% for each day delay. See Report Guidelines below for instructions on the number of copies and to whom the report should be submitted.
- Week 14 Orally present the fruit-of-your-FYP-labor at a department-scheduled formal presentation (P2) session. (Team members should expect score variation on this deliverable to reflect the communications effectiveness of each team member).

Prepare and perform a combined project demonstration (D) and technical poster session (TP) at a time & location mutually agreeable to your FYP team and the judging committee preferably just before or after demonstration. The demonstration and poster display carry separate grades (see below). This must be a separate deliverable from the presentation above. Even in the case where the deliverable is not a physical object (i.e., computer program, analysis, etc.)

this deliverable should be held and presented in free-form so that assessors may fairly assess the work quality.

The Timelines for the FYP and FEASC are illustrated in the figure below



Project Deliverables

EXPECTATIONS

Fall semester

- Project proposal (50%)
See description in Week 13 of Fall Semester timeline above.
- End of term presentation (25%)
This is an early dry run of the real thing to come at the end of the Spring Term (see below). An intermediate point where the shakers and movers are rewarded and the slackers are told to get moving.
- Individual student performance I (25%)
Throughout the duration of the project, the students are expected to perform in a professional and responsible manner cognizant of the letter and spirit of these guidelines. Overall motivation and adherence to the guidelines will be reflected by the advisor's evaluation of the performance of individual team members during the Fall Term.

Spring semester

- Interim report (15%)
This score will gage your individual progress in the first half of the Spring Term. This interim report is an early check point is envisioned to give the advisor(s) an idea about the sanity/progress of the work. Although this report is a miniature version of the final report, the format should still abide by the format of the final report articulated below.
- Individual student performance 2 (5%)
This score will gage your individual progress in the first half of the Spring Term.
- Final report (30%)
This written document is where you document and deposit the project's total net worth. Instructions on how to prepare the final report follow. Please note that some reports will be randomly selected and checked for plagiarism as defined at <http://staff.aub.edu.lb/~eplagio/index.htm>. If plagiarism is discovered, the maximum available disciplinary action will be vigorously pursued, likely resulting in failure of the course and delay of graduation. Please do not take any chances; read the text box titled "how students can avoid plagiarism" at http://staff.aub.edu.lb/~eplagio/Student_Resources.htm. Ignorance will not be taken as a valid excuse for plagiarism.
- Combined project demonstration (15%) and technical poster (5%)
This is where you prove to the assessors that your project performed as well as you claim it did in the report and the presentation! An FYP demonstration session must be held within a short time before or after the team's formal presentation. Time and venue to be agreed upon by the team and the assessors. The project demonstration event will be open and public.

Technical Poster display: If you were to think of the Report as a novel (full-sized story), think of the Technical Poster as the short version of the report. The poster format should be chronological, concise, and logical and is to summarize your FYP in a snap-shot. IT IS NO A MOVIE POSTER OR A TOOTHPASE AD. See resources available on the FYP webpage for tips on preparing a poster.

- Formal presentation, p2 (20% of final fyp score)

This is where you display your grasp of your project via oral and multi-media communication means. The formal presentation session will be open and public. All presentations are allocated twenty minutes and all participants of the project must take part in the presentation. Prepared presentation should last fifteen (15) minutes followed by up to five (5) minutes of Q&A.

- Student performance 3, s p3 (10%)

This score will gage your individual progress in the second half of the Spring Term.

- Other deliverables (as part of the graduation checkout procedure)

All final years projects in their entirety will be the sole property of the university and as such must be delivered to the department at the conclusion of the project. These deliverables include all hardware, software, models, intellectual properties, databases, documentation, and all other items produced in the course of the work. In the case of sponsored projects, the university may waive this right of ownership in favor of the sponsoring party.

Project Reports

GUIDELINES

CONTENTS OF THE INTERIM REPORT

The recommended structure of this report is discussed below, together with suggestions on the appropriate contents of each section. However, these are only guidelines to assist you in preparing this document. There is great diversity in the types of projects undertaken by students, and that may influence the weighting or emphasis you give to the various sections of your report. The interim report must be uploaded to the Moodle website for this course by the due date specified in the “At a glance” section at the beginning of this document. No hard copy should be submitted. A penalty of 10% per day delay will be strictly enforced by the FYP Coordinator.

1. Table of Contents

2. Summary

In one page, certainly not more than two, summarize the main features of your project, what problem it is solving and how you propose to solve it. This brief overview should give a snapshot of the overall structure of your final year project.

3. Introduction

Outline the scope of your project. How did the problem present itself to you in the first place? Describe the nature of the problem in detail.

4. Background and Literature Review

Describe what you have discovered in your literature search or market survey. Does this problem or one similar to it exist anywhere else? Who is working on it? How have others solved it? Critically evaluate the pros and cons of the major approaches taken by previous workers.

5. Proposed Solution

Outline in detail your approach to solving the problem. Describe the proposed solution methods and the progress you have achieved. Reference your formal specifications and design documents, which can be placed in the Appendix. If you have implemented a prototype of your solution, discuss it, and describe its behavior

6. Implementation Plan

Lay out the project implementation plan for the next semester. Discuss the project's target and milestone dates. If you will be implementing your project in discrete stages, describe them and discuss how far you think you will be able to get.

7. Conclusion

8. Bibliography

Include here all bibliographic materials referenced within your report.

9. Appendix

Some of the highly technical details from the above sections can be placed in the Appendix and referenced from the body of the report. Include all relevant technical documentation, such as specification documents, design documents, and code listings.

CONTENTS OF THE FINAL REPORT

One hard copy of the final report should be submitted to each of the project evaluators and advisor. An additional hard copy should be submitted to the ME Department Secretary. A soft copy of the final report and any related files such as computer source codes or data should be submitted on CD to the project advisor. The due date for the final report is given in the "At a glance" section at the beginning of this document.

The recommended structure of the final report is discussed below, together with suggestions on the appropriate contents of each section. However, these are only guidelines to assist you in preparing this document. There is great diversity in the types of projects undertaken by students, and that may influence the weight or emphasis you give to the various sections of your report.

10. Table of Contents

11. Management Summary

As with the Interim Report, you begin your Final Report with a Management Summary. Write this section last as it is here that you will step back and give an overview of what has been achieved. In one page, certainly not more than two, list the main features of your project, what problem you were solving and how you solved it.

12. Introduction

How did the problem originally present itself to you in the first place, and how did it evolve over the course of the project. Give a detailed summary of the problem as well as the literature review and the market survey if applicable. You will probably be able to take much of this material from the Interim Report.

13. The Solution

Describe your solution in detail. You may refer to the Appendix for detailed computer code or other technical materials, but some summary or overview diagrams of the

solution should be placed in the body of the report. This will help the reader get a sense for the overall structure of the solution.

14. The Implementation Process/Results

Describe the process you went through to complete the project and compare what actually happened with the goals you were trying to achieve. Highlight any major variations from your original plans. Discuss the behavior of the finished program, and show some of its functionality.

15. Conclusion

Describe what has been accomplished and what are the major things that you learned from this project? What work still needs to be done on the system and how can it be improved and/or enhanced? Do you have any future plans for this software package?

16. Bibliography

Include all bibliographic materials referenced within your report.

17. Appendix A

All reports are required to include an Appendix A which should contain two sections, listed below.

1. How this project incorporates appropriate engineering standards and multiple realistic constraints.

In this section, you should explicitly state the constraints that were relevant to the design or execution of your Final Year Project. Normally, these constraints will include the constraints given in the original project problem statement circulated by the ME Department, however these constraints may have been modified in consultation with your advisor over the course of the FYP. Constraints may address political, social, economic, environmental, ease of manufacture, ergonomic, technical or other factors. Constraints should be detailed and specific to the project at hand, not generic. For example:

- The elevator brake design must incorporate at least two safety redundancies in the event that the primary mechanism fails.
- The bill of materials required of the final design must cost less than \$300 when purchased over-the-counter in Beirut at the time of the project's completion.
- At least 50% of the mass of the vehicle must be derived from recycled materials.

2. Disciplinary assignments by team member.

In executing this project, each team member was required to be responsible for a particular area of expertise. E.g. CAD, mechanics, heat transfer, chemistry, biology, economics, circuits and electronics, project management, environmental impact,

programming. List below the name of each team member and her/his assigned area(s) of expertise.

18. Remaining Appendix

Some of the minute detail of the sections above can be relegated to the Appendix and referenced from the body of the report. Include all relevant documentation, computer coding, screen displays, etc.

PROPOSAL, INTERIM AND FINAL REPORT FORMATTING

19. Cover and Title Page

The cover of the Final Report must contain the project title, author names, faculty advisor(s), and date of submission.

20. Document Layout

Any typographical errors must be carefully corrected.

A margin of 30 mm wide should be allowed for binding on the left hand side of the page: margins of 20 mm should be used at the other edges of the page. A 1.5 line spacing is recommended in between the lines, and black Arial font size 10 should be used throughout the document. Do not use ^{Word Art} or other gimmicky features unfortunately available in Microsoft products. Keep it simple and clean. Limit use of colors to black and white, unless absolutely necessary to express an idea (e.g. in a figure).

The report length may not exceed 75 pages (including all appendixes and supporting documentation) but it should be no less than 20 pages-long.

The font type for charts, graphs, and diagrams may be different based on their size and layout.

21. Tables and Figures

All figures and tables must be referred to in the text. They should be given short informative titles, single spaced, and should be numbered consecutively in Arabic numerals. For example:

Figure 1. Effect of residence time on mean gas temperature. Calculations based on initial temperature of 290K and single-step reaction kinetics.

Here are some other things to remember when presenting your results in figures or tables:

- All rows and columns should have an appropriate title
- All units should be clearly indicated
- The analysis and meaning of the values contained in the table should be fully elaborated in the body of the text.
- Make the visual large enough that all the text and data values can be easily read.

Grading and Assessment

You will receive a single grade for the two-semester, final year project course. 25% of the grade is based on your work in Fall Semester and 75% is based on the work in the Spring Semester. The following chart describes the components of this grade:

	Activity	Percent(%)
Fall Term	Presentation	40
	Literature Review Report	50
	Individual Performance	10
Spring Term	Interim Report	15
	Business/Research	5
	Final Report	25
	Project Presentation	20
	Project Demonstration	15
	Technical Poster	5
	Individual Performance	10
	FYP Participation	5

Appendix I: Forms

FYP SELECTION FORM

Academic Year		Date
.....	
Project(s)	Project Title	Project#
1	.....	.....
2	.....	.....
3	.....	.....
4	.....	.....
Team Members	Name	ID
	a. ....	.....
	b. ....	.....
	c. ....	.....
Advisor(s)		
	a.	

	b.	

PROJECT GRADING FORM

	Interim Presenta- tion	Interim Report	Project Demon- stration	Project Presenta- tion	Technical Poster	Final □Report	Individual □Perform ance
	5%	20%	15%	20%	5%	30%	5%
Team Grade							
Individual Grade							
a.							
b.							
c.							
d.							

POINTS TO CONSIDER DURING THE PROJECT ASSESSMENTS

Project Presentation Assessment

- Was the candidate's presentation clear and audible?
- Did the candidate address the audience, avoid reading and distracting mannerisms?
- Did the candidate express enthusiasm for the topic and engender your interest?
- Were visual aids clear and helpful?
- Were the overheads/computer presentations easy to understand?
- Did the presenter(s) give an overview or summary of the project?
- Did the candidate keep to time whilst presenting material at a comprehensible rate?
- Did the candidate answer questions clearly and knowledgeably?
- Was the paper professionally presented?

Individual Performance Assessment

- Was the candidate enthusiastic about the project?
- Has the candidate shown an overall professional attitude throughout the duration?
- Has the candidate succeeded in meeting deadlines and sticking to schedule?
- Overall, was the candidate cognizant of the letter and spirit of the guidelines called out in this document?

Interim Report Assessment

Introduction and Problem Statement

- Is the problem stated both in a general and in a specific way?
- Is the purpose of the study stated?
- Are the questions or hypotheses stated?
- Does the reader get a general view of both the rationale for the investigation and its relationship to a theory.
- Is the beginning fairly broad and does the section narrow to a focus at the end?

Review of the Literature

- Does it show thorough knowledge of the research, theory, concepts, ideology, and opinion related to the topics.
- Is the reader made aware that the review has been selective and the criteria for selection and relevance explained?
- Is there any critical assessment of the reviewed literature?
- Does the review reveal the relation between what has previously been done by others and what is proposed?

- Are suitable headings used to help the reader sort out the sections of the review?
Is each section summarized?

Are transitions provided from one section to another?

Please give a score for each criterion. Other intermediate marks are acceptable.

Report Item	Max Mark	Actual Mark
Do the abstract and introduction clearly and concisely outline the nature and scope of the project?	2	
Was the literature survey or survey of "Prior art" critical and appropriate for the project?	2	
Were the methods of investigation adequately explained?	2	
Were the results clearly presented and logically ordered? Were the results adequately analyzed and critically evaluated?	2	
Were the appropriate conclusions drawn and did they relate to the objectives of the investigation?	2	
Was the report presented generally in accordance with FYP Student Guidelines DCN ME0001 section II.2.3.1 'Final Report'?	5	
TOTAL (R)	15	

Final Report Assessment

Method or Procedure

- Does it explain what was done to gather the information essential to the investigation?
- Would it be possible for another person to gather data and analyze it exactly in this study?
- If human subjects are used, are they adequately protected? (May apply for ergonomic or biomedical projects).
- Are the variables in the study identified and described?

- If controls are used, are they explained in sufficient detail?
- If materials or apparatus are involved, are they described, illustrated, and their history and usefulness indicated?
- Is the setting of the study specified?
- Are safety requirements taken into consideration?

Results and Discussions

- Are the meaning and importance of the results indicated?
- Are alternative explanations for the findings identified and discussed?
- Does the reader learn how information in raw form was summarized? Descriptive statistics? Content analysis?
- Do tables contain all essential information so they can be read without references to the text?
- Does each table stand on its own, clear and self-explanatory?
- Do figures contain all essential information so they can be read without references to the text?
- Does each figure stand on its own, clear and self-explanatory?
- Are results grouped in relation to questions or hypotheses?
- Are incidental findings not immediately related to the questions or hypotheses reported?
- Are there unforeseen results?
- If applicable, does the report account for environmental impact assessment?
- Is redundancy eliminated or minimized?
- Is this section free of interpretations of results?

Conclusion

- Are conclusions drawn about each question or hypothesis?
- Are the limitations on conclusion specified?
- Does the reader learn how successful the investigation was and what further study might be needed on the topic?

Please give a score for each criterion. Other intermediate marks are acceptable.

Report Item	Max Mark	Actual Mark
Do the abstract and introduction clearly and concisely outline the nature and scope of the project?	5	

Was the literature survey or survey of “Prior art” critical and appropriate for the project?	5	
Were the methods of investigation adequately explained?	5	
Were the results clearly presented and logically ordered? Were the results adequately analyzed and critically evaluated?	5	
Were the appropriate conclusions drawn and did they relate to the objectives of the investigation?	5	
Was the report presented generally in accordance with FYP Student Guidelines DCN ME0001 section II.2.3.1 ‘Final Report’?	5	
TOTAL (R)	30	

Final Presentation and Technical Poster assessment

- Was the candidates presentation clear and audible?
- Did the candidate address the audience, avoid reading and distracting mannerisms?
- Did the candidate express enthusiasm for the topic and engender your interest?
- Were visual aids clear and helpful?
- Were the overheads/computer presentations easy to understand?
- Did the presenter(s) give an overview or summary of the project?
- Did the candidate keep to time whilst presenting material at a comprehensible rate?
- Did the candidate answer questions clearly and knowledgeably?
- Was the paper professionally presented?
- Was the candidate’s poster clear and informative?
- Was the poster easy to understand?
- Did the poster give an overview or summary of the project?

Final Individual Performance Assessment

- Was the candidate enthusiastic about the project?

- Has the candidate shown an overall professional attitude throughout the duration?
- Has the candidate succeeded in meeting deadlines and sticking to schedule?
- Overall, was the candidate cognizant of the letter and spirit of the guidelines called out in this document?