Guidelines for Project I Delivery and Assessment
Department of Industrial and Mechanical Engineering
Lebanese American University

Approved: July 6, 2009
Amended: July 28, 2009
Amended: October 30, 2009
Amended: January 30, 2010

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1. Course Objectives

The final year project or Project I aims at providing students with a design experience in a setting that is as close as possible to real-life experience. Students are required to group into project teams (2 to 4 members usually) to work on multidisciplinary projects where each project covers at least 2 areas of Industrial and/or Mechanical engineering.

In Project I students are expected to utilize what they have learned in previous courses, learn new skills or concepts, and achieve a design that meets desired needs within realistic constraints and the time limit provided. Each student needs to demonstrate sound problem solving and analytical skills both in group and individually.

Project I will be completed over 2 semesters typically Fall and Spring. Students are required to present their work at the end of the first semester in the form of a preliminary report and oral presentation to a panel of concerned faculty and will earn a grade that will count 30% of their final grade. The final presentation will be at the end of the second semester where students are expected to submit a written report and deliver an oral presentation to an audience consisting of faculty members, students, and invited guests from industry when applicable. The final grade will be a composite of the grades earned in both semesters.

2. Student Outcomes

The course is used as assessment station to assess the program outcomes shown in the table below:

Program Outcome	Method of Assessment[1]
(c) An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, health, safety, and manufacturability	PO(c) Rubrics on Design outcome, written report and oral presentation
(d) An ability to function on multidisciplinary teams	PO(d) Rubrics filled by teammates and supervisors
(f) Understanding of professional and ethical responsibility	PO(f) Rubrics on special assignment given to students in class
(g) An ability to communicate effectively	PO(g) Rubrics on written report and oral presentation
(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	PO(h) Rubrics on special assignment and interim report and oral presentation

The assignments used in evaluating the achievement of PO(h) and PO(f) are found in Appendix E and F respectively

[1] Rubrics referenced here are different from the rubrics shown in the Appendices of this report and used in evaluating student work on Project I. Rubrics referenced here are solely used to evaluate achievement of Program Outcomes.

3. Course Learning Outcomes

Upon successful completion of this course, the student is expected to be able to:

1. Convert an open-ended problem statement into a statement of work or a set of design specifications
2. Decompose design problem into subtasks, prioritizes subtasks, and establishes a timetable and milestones by which progress may be evaluated
3. Select and apply appropriate models, or simulations of the real world and analyzes output of models/simulations to provide information for design decisions
4. Perform feasibility analysis and uses results to choose candidate solutions and evaluates quality of solutions to select the best one
5. Produce usable documents of record regarding the design process and design state
6. Collaborate with team members to achieve a common goal
7. Collaborates with team members of diverse background and perspectives

4. Allocation of Projects

Students will choose from a list of topics provided on the school web site by the IME department ***http://services.sea.lau.edu.lb/abet/Project.html***. The same project can be allocated to more than one team where teams would compete for the best design. Team allocation to projects is normally done on a first-come-first-served basis and subject to capacity limit set on the maximum number of teams allowed on each project. The final approval of project allocation to teams will be done by the faculty in the department and will take into consideration how well the topic can be developed to a satisfying level by the project team.

Each project team is assigned one or more supervisors depending on the project areas. The supervisors will grade the project according to the guidelines detailed in section 5.

5. Project Assessment

Projects will be evaluated using Rubrics that assess

- interim progress presented at the end of the first semester
- the design development and final solution assets
- the final written report
- the final oral presentation

Rubrics used to assess the above are provided in appendices A through D[2]. Each team member on a project will be assessed individually by each supervisor on the project using the rubrics provided in the Appendices. The average scores of all supervisors for each rubric are combined using the following percentages to get a weighted average grade point.

Rubric	Weight
Interim progress assessment	30%
Design development & Solution Assets	40%
Final Written Report	15%
Final Presentation	15%

[2] All the rubrics were adapted from: A guide to Project Assessment for Staff and Students, Macao Polytechnic Institute, School of Public Administration, Computer Studies program.

The weighted average grade point is converted to a grade using the following table.

Grade point range	Grade
$3.9 \leq x < 4$	A
$3.67 \leq x < 3.9$	A-
$3.33 \leq x < 3.67$	B+
$3 \leq x < 3.33$	B
$2.67 \leq x < 3$	B-
$2.33 \leq x < 2.67$	C+
$2 \leq x \leq 2.33$	C
$1.67 \leq x < 2$	C-
$1.33 \leq x < 1.67$	D+
$1 \leq x < 1.33$	D
$0 \leq x < 1$	F

6. Student's Responsibilities

The responsibilities of the students may be summarized as follows:

- Students in a team should split the work among them and assign a team leader. The team leader role will be rotated among team members over the project duration to enable all members of the team to assume this role at least once. It is the responsibility of the team leader to distribute the work evenly among the members of the team and to monitor the progress of the work to make sure that tasks are completed on time. The team leader should make sure that each member of the team has enough contribution to the project. The role of the team leader is different from the supervisor's role which is more like a consultant or expert.
- To attend meetings with supervisors during the scheduled class meeting time as posted on the banner or differently as agreed upon with their supervisors.
- To seek knowledge, information and all details needed for developing the design. It is not the responsibility of the supervisors to provide ready-made solutions.
- To formulate the problems before asking the supervisors.
- To be self-motivated and not expect to be spoon-fed by their supervisors.
- To report immediately to the supervisor any difficulties that would interrupt their work.

7. Supervisors Responsibilities

The supervisor's responsibilities may be summarized as follows:

- To define the project objectives and the expected deliverables.
- To provide advice and guidance but leave solutions to the students.
- To explain the project assessment method to the students.
- To be available to the student for consultation during assigned class time.
- To evaluate the student's project using the assessment rubrics presented above.

8. Project Work

8.1 Design Development

Students are required to group into project teams (2 to 4 members usually) to work on multidisciplinary projects where each project covers at least 2 areas of Industrial and/or Mechanical engineering.

There are typically 5 steps to the project development and these are as follows. The exact tasks to be completed however would vary from project to project.

Define problem: It involves converting the open-ended problem of your project into a statement of work or a set of design specifications.
Decomposition / repartition of tasks: It involves decomposing the design problem into subtasks, prioritizing the subtasks and establishing a timetable and milestones by which progress may be evaluated. This step requires much organization and planning in order to sequence the subtasks and partition assign them to team members.
Problem solving: It involves finding an answer to the problem/need/requirement. At this stage, you are expected to select and apply appropriate models or simulations of the real world and analyze their output in order to provide useful information for design decisions.
Generate design and or solution assets: It involves performing a feasibility analysis and using the results in order to choose candidate solutions, evaluate candidate solutions, and select the best one.
Documentation and Final Presentation: It involves producing a usable document of record regarding the design process and design solution. This is the most important step of your FYP, since the good quality of your work is mostly reflected by the quality of the presented document. In the final presentation, you are given the chance to explain and defend your design solution and highlight its merits in term of cost, quality, manufacturability, etc.

To finish the project on time, students are expected to deliver a team Work Plan or schedule of tasks to be done and to monitor their progress. In particular, it is the responsibility of the team leader to monitor the progress of the work and to make sure that tasks are completed on time and that corrective action is taken when work is not progressing according to schedule. This Work Plan is updated weekly after each meeting with the supervisors to reflect feedback from them.

8.2 Meetings with Supervisors

Students are expected to meet with their supervisors and provide activity reports on a weekly basis over the 2 semesters time period. This shall take place during the time slot reserved by the department for the course (check course offerings catalog).

The first meeting will be an orientation meeting where supervisors go over this document and explain to students the course learning outcomes and the program outcomes addressed in this course along with the assessment tools used to evaluate their work. All other regular meetings with supervisors serve as a good opportunity for the supervisors to monitor students

learning in this course, address difficulties encountered by students and assess progress of the work.

8.3 Interim Report and Project Presentation

At the end of the first semester, students have to submit a written progress report and present their findings orally with slide show to their supervisors. The purpose of this arrangement is 1) to give the students the opportunity to tidy up and organize their findings so far and 2) to gain a presentation experience which is helpful for their final project presentation.

8.4 Final Project Report

The Final Project Report should include the following topics:

1. Cover page
2. Table of contents
3. List of tables
4. List of Figures
5. Abstract of less than 1 page
6. Main text detailing the
   (i) The problem statement
   (ii) Methodology used in building the solution
   (iii) Preliminary results and analysis of results
   (iv) Description of the final design or solution asset
   (v) Merits of the proposed solution (economical, sustainability, etc)
   (vi) Conclusions
7. References
8. Appendix

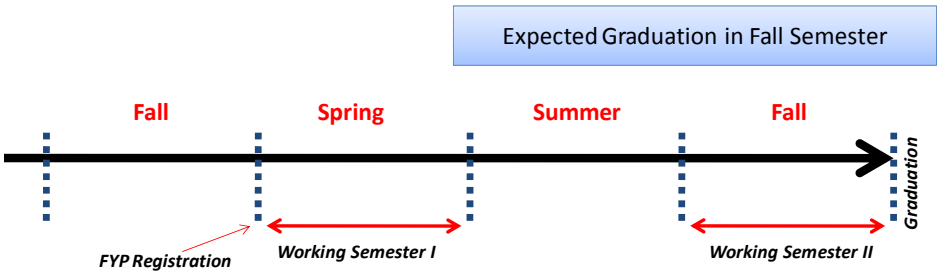
Along with the final report, the project team has to submit to their supervisors a job distribution sheet describing which parts of the project are done by each member of the team. The distribution sheet is used to better evaluate the work of each student individually.

8.5 Final Project Presentation

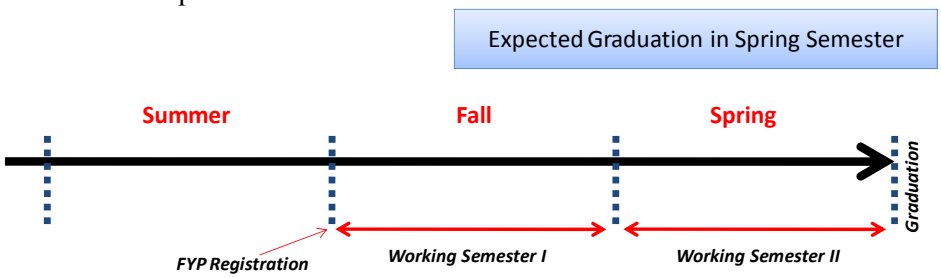
Oral presentations are considered as an important part of the graduation project assessment. A good presentation does not only require the proficiency in spoken English but also the ability to transfer information in a manner that is interesting, informative, and accurate.

9. Schedule

Project I will be completed over 2 semesters typically Fall and Spring. Students expected to graduate at the end of a Fall semester should register their FYP at the start of the previous Spring semester.



Students expected to graduate at the end of a Spring semester are requested to register their FYP at the start of the previous Fall semester.



Students graduating in Fall'09 can exceptionally register their FYP in Summer I' 09, Summer II' 09 or Fall'09.

Students are required to present their work at the end of the first semester in the form of an interim progress report and an oral presentation to their supervisors. The final presentation will be at the end of the second semester where students are expected to submit a written final report to their supervisors and deliver an oral presentation to an audience consisting of faculty members, students, and invited guests from industry when applicable. The final grade will be a composite of the grades earned in both semesters.

The Project I course involves a number of activities and deadlines. The general schedule is shown below. The exact dates will be announced in class.

	Deadline	Tasks / Deliverables
First Semester	Two weeks before the start of semester	• Posting on the web page the list of project topics
	Week 1	• Selection of project • Forming project teams
	Week 2	• Final approval of project teams and project allocation to teams • Orientation meeting with project supervisors
	Week 3	• Submission of Work Plan to supervisors • Approval of Work Plan
	Week 15 of first semester	• Interim Progress Report submission • Presentation of work accomplished so far
Second Semester	Week 1	• Summary update meeting on first semester work • Submission of Work Plan to supervisors for second semester
	Week 10	• Submission of Final Report • Informal presentation to supervisors
	Week 11	• Submission of Corrected Final Report after feedback from supervisors
	Week 11	• Final Project Presentation

9. Deliverables before final project presentation

You should submit the following documents to your supervisors (a copy of each to each project supervisor)

(i) Submit Project report (printed copy)
(ii) Submit Project CD (including PPS of presentation, project report as .DOC file, programs, source code of system developed if any).

Appendix A. Interim Progress Assessment Rubric[3]

Project: _____

Name of Student: _____

Name of Supervisor: _____

Each supervisor on the project must fill a rubric for each student on the team

	Barely acceptable 1 point (D)	Basic 2 points (C)	Good 3 points (B)	Very good 4 points (A)	Grade
Problem formulation	• Bare formulation • Bare understanding of the problem, with scarce knowledge of relevant material	• Basic formulation • Basic understanding of the problem, but lack appropriate study of relevant material	• Clear formulation • Good understanding of the problem, with study of relevant material • Good system analysis	• Clear formulation with well defined scope • Very good understanding of the problem and relevant material • Near production quality system analysis	
Self-motivation and project management	• Slow progress, with barely satisfactory result • Unresponsive to supervisor	• Slow progress, with basic project outcome • Rely on supervisor's push to work	• Good progress • Need reminder sometimes • Minor problems in project management	• Steady progress • Highly self-motivated • Good project management	

Student failing to meet the "barely acceptable" level will receive a score of 0

[3] Rubric adapted from: A guide to Project Assessment for Staff and Students, Macao Polytechnic Institute, School of Public Administration, Computer Studies program.

Appendix B. Design Development and Solution Asset Rubric[4]

Project: _____

Name of Student: _____

Name of Supervisor: _____

Each supervisor on the project must fill a rubric for each student on the team

	Barely acceptable 1 point (D)	Basic 2 points (C)	Good 3 points (B)	Very good 4 points (A)	Grade
Analysis and solving skills	• Obvious solution, sketchy functionalities	• Simple, yet mostly complete solution that solves the stated problem	• Complete solution with nontrivial functionalities that meet the desired needs	• Provide solution to complex problems; Solution optimize desired needs	
Innovation in the Design Solution and self-study	• Basic concepts used correctly • Lack self-study, but apply previously taught technique on a satisfactory level	• Superficial usage of new concepts • Self-study of new technique, with basic understanding	• Self-study of new concepts / technique, with good understanding • Minor innovative work	• New concepts used frequently • Self-study of new technique and solve technical difficulties; • Innovative work with research value	
Self-motivation and project management	• Slow progress, with barely satisfactory result • Unresponsive to supervisor	• Slow progress, with basic project outcome • Rely on supervisor's push to work	• Good progress • Need reminder sometimes • Minor problems in project management	• Steady progress • Highly self-motivated • Good project management	

Student failing to meet the "barely acceptable" level will receive a score of 0

[4] Rubric adapted from: A guide to Project Assessment for Staff and Students, Macao Polytechnic Institute, School of Public Administration, Computer Studies program.

Appendix C. Written Report Rubric[5]

Project: _____

Name of Student: _____

Name of Supervisor: _____

	Barely acceptable 1 point (D)	Basic 2 points (C)	Good 3 points (B)	Very good 4 points (A)	Grade
Content	• Important points covered only superficially • No major errors and misconceptions	• Covers important points • A few inaccurate or irrelevant points	• All major points covered and explained clearly and correctly	• Major points strongly supported with suitable detail	
Writing	• Frequent errors in spelling and grammar • Mostly readable, but a few points are hard to understand	• Some errors in spelling and grammar • Readable • Follow basic written report structure	• A few errors in spelling and grammar • Readable and easy to understand	• Well proofread • Clear and easy to understand • Graphs and diagrams used appropriately	

Student failing to meet the "barely acceptable" level will receive a score of 0

[5] Rubric adapted from: A guide to Project Assessment for Staff and Students, Macao Polytechnic Institute, School of Public Administration, Computer Studies program.

Appendix D. Final Presentation Rubric[6]

	Barely acceptable 1 point (D)	Basic 2 points (C)	Good 3 points (B)	Very good 4 points (A)	Grade
Content	• Important points covered only superficially • No major errors and misconceptions	• Covers important points • A few inaccurate or irrelevant points	• All major points covered and explained clearly and correctly	• Major points strongly supported with suitable detail	
Presentation skills	• Bare organization and preparation • Lack of confidence and familiarity in some parts of the presentation	• Basic organization and preparation • Confident in only some parts of the presentation	• Good organization and preparation • Confident in most parts of the presentation • Attractive to audience	• Excellent organization and preparation • Confident and relaxed in the whole presentation • Engaging to audience	
Communication (Q/A)	• Answer at least one questions correctly • Need clarification	• Answer most questions correctly • Need clarification sometimes	• Answer most questions correctly and concisely	• Handle difficult questions with ease and confidence • Illustrative explanation	

Student failing to meet the "barely acceptable" level will receive a score of 0

[6] Rubric adapted from: A guide to Project Assessment for Staff and Students, Macao Polytechnic Institute, School of Public Administration, Computer Studies program.

Appendix E. Assignment for Evaluating PO(f) Achievement

This assignment is designed to measure your understanding of professional and ethical responsibilities as it relates to this project. Professional codes and standards refer to regulations that engineers must agree to uphold and abide by. Not abiding by these codes by being dishonest or negligent is considered a highly unprofessional and unethical conduct in practice of engineering and might result in a sequence of unfortunate events. (loss of life, collapse of a structure.etc.)

Project Title: **Date:**

Student Name: **ID:**

Answer the following questions to the best of your knowledge and as they pertain to your design project.

1) List and discuss professional codes, standards and regulations applicable to your project and highlight their impact on your design.

2) Identify and discuss pertinent ethical issues that are relevant to your design project if any.

Appendix F. Assignment for Evaluating PO(h) Achievement

This assignment is designed to measure your capability to discuss the impact of engineering solutions in a global, economic, environmental, and societal context. The global and environmental discussion may include protection of the environment, global warming less harmful criteria, human welfare, and EPA regulations. The economic discussion may include implications (such as entrepreneurship potential, manufacturability, sustainability, usability, and capital-labor issues). The social discussion may address topics (such as comfort of usage , protection of equipment from social habits, and public safety).

Project Title: **Date:**

Student Name: **ID:**

Answer the following questions to the best of your knowledge and as they pertain to your design project.

1) List and discuss all past engineering solutions (designs) relevant to your project and their impact in all relevant contexts mentioned above (such as global, economic, environmental, and societal).

2) List and discuss all state of the art engineering solutions (designs) relevant to your project and their impact in all relevant contexts mentioned above (such as global, economic, environmental, and societal).

3) Discuss the impact of your proposed design in all relevant contexts (such as global, economic, environmental, and societal).

LEBANESE AMERICAN UNIVERSITY

SCHOOL OF ENGINEERING

Department of Industrial and Mechanical Engineering

<<PROJECT I Title>>

INE591 PROJECT I

<<Term and year>>

Students Names & ID:

DATE REPORT PRESENTED:

Project I Advisors:

[Table of Contents]

[List of Figures]

[List of Tables]

Abstract

<< less than 1 page>>

Main text detailing the following

(i) The problem statement

(ii) Brief background review of old and state of the art engineering solutions relevant to the project and the impact of these solutions in a global, societal, economical, or environmental context

(iii) Methodology used in building the solution

a. A listing of applicable standards and professional codes used in the project. These standards should be properly referenced in the text whenever used.

(iv) Preliminary results and analysis of results

(v) Description of the final design or solution asset

(vi) Merits of the proposed solution (economical, sustainability, etc)

a. List all realistic constraints that were accommodated by the proposed design. Evaluate the proposed design and how it meets realistic constraints like economic, manufacturability, sustainability, environmental, political, social, etc.

b. Impact of **your proposed solution** in a global, societal, economical, or environmental context (whatever is applicable to the project at hand)

c. Any ethical issues relevant to the project (need not be in every project)

(vii) Conclusions

References

Appendices