A- Course Identification & General Information

1. Course Title: Introduction to Engineering Design I  
   Course Code: GE 211

2. Credit Hours: 3  
   Lecture: 2  
   Tutorial: -  
   Practical: 4  
   Total: 6

3. Program in which the course is offered: Mechanical Engineering Program

4. Coordinator: Assoc. Prof. Al-Badrawy A. Abo El-Nasr
   Instructors: Assoc. Prof. Abdel Raheem Ammar
                Assoc. Prof. El-Ameer Sami
                Assoc. Prof. Mohamed El-Ta-yib

5. Academic year: 3rd Year  
   Level: 5th Level

6. Pre-requisites of the course:

7. Co-requisites of the course:

8. Location: In-Campus
B- Objectives of the Course

1- Summary of the main learning outcomes for students enrolled in the course

This course is the first in a two semester sequence designed to accomplish the following:

- To develop an understanding of the engineering design process from the recognition of a need and definition of design objectives and requirements through completion of project.
- To foster student creativity.
- To broaden students’ concept of engineering problems to include all factors that impact a final problem solution.
- To provide students with insight into the nature of engineering.
- To help students gain experience on design through a design project.
- To help students gain experience working in teams.
- To help students learn ethical and legal issues in engineering.
- To help students develop communication skills through written and oral presentation of the design work.

2- Course development plans

Plans for Course Development:
- Increase of web-based reference material through the establishment of a web-site linked to the college site and including text and exercise materials.
- Updating the course material through the continuous development of the college undergraduate plan and the curriculum.

C- Course Description:

(Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1- Course contents:

<table>
<thead>
<tr>
<th>Topics</th>
<th>Week</th>
<th>Hours</th>
<th>Lectures (Concept)</th>
<th>Practical (Lab)</th>
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</thead>
<tbody>
<tr>
<td>Engineering design or how engineers approach and solve problems; process and product design</td>
<td>1st</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<td>2nd</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<tr>
<td>Quality principles;</td>
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<td>6</td>
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<td>4</td>
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<td>4th</td>
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<td>2</td>
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<tr>
<td>Working in teams;</td>
<td>5th</td>
<td>6</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>presentation, organization and assessment of technical work</td>
<td>6th</td>
<td>2</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>7th</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Mid Term Exam</td>
<td>8th</td>
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### 2- Course components (total contact hours per semester):

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<thead>
<tr>
<th></th>
<th>9th</th>
<th>10th</th>
<th>11th</th>
<th>12th</th>
<th>13th</th>
<th>14th</th>
<th>15th</th>
<th>16th</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>28</td>
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<td>Tutorial</td>
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<tr>
<td>Practical</td>
<td>56</td>
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<tr>
<td>Other</td>
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</table>

### 3. Additional private study/learning hours expected for students per week. (This should be an average: for the semester not a specific requirement in each week)

### 4 – Intended Learning Outcomes of the Course (ILOs)

(i) Description of the knowledge to be acquired

**Knowledge and Understanding of:**

- a1- to understand the basic design process.
- a2- to determine significant design requirements.
- a3- to identify strategies for intellectual property protection.
- a4- to understand driving factors of innovation.
- a5- to understand the need for optimization and determine objectives.

(ii) Teaching strategies to be used to develop that knowledge

- t1- Lectures
- t2- Assignments, at home
- t3- Discussions in the class
- t4- Case study report (data collection, Internet search, and reporting)
- t5- Mini project (Design - Hardware / Software Development), Supervised

(iii) Methods of assessment of knowledge acquired

- s1- Quizzes
- s2- Case Study Report
- s3- Discussion Groups
- s4- Midterm Exams
- s5- Final Exam

(i) Cognitive skills to be developed
b1- to appreciate the relationship between synthesis and analysis.
b2- to identify goals and strategies for simulation and modeling.
b3- to identify factors for sustainability and environmental design.
b4- to identify appropriate standards and testing methods.
b5- to identify and evaluate ethical issues.
b6- to understand the professional and ethical responsibility.

(ii) Teaching strategies to be used to develop these cognitive skills

t1- Lectures
t2- Assignments, at home
t3- Discussions in the class
t4- Case study report (data collection, Internet search, and reporting)
t5- Mini project (Design - Hardware / Software Development), Supervised

(iii) Methods of assessment of students cognitive skills

s1- Quizzes
s2- Case Study Report
s3- Discussion Groups
s4- Midterm Exams
s5- Final Exam
s6- Group mini-project

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed
c1- to manage design projects.
c2- to form and maintain effective teams.
c3- to document results of design and development projects.

(ii) Teaching strategies to be used to develop these skills

t1- Lectures
t2- Assignments, at home
t3- Discussions in the class
t4- Case study report (data collection, Internet search, and reporting)
t5- Mini project (Design - Hardware / Software Development), Supervised

(iii) Methods of assessment of students numerical and communication skills
Department of Mechanical Engineering

s1- Quizzes
s2- Case Study Report
s3- Discussion Groups
s4- Midterm Exams
s5- Final Exam
s6- Group mini-project

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

d1- to able to prepare and deliver technical briefings
d2- to able to communicate effectively.
d3- to able to write reports and oral presentation.

(ii) Teaching strategies to be used to develop these skills

1- Lectures
2- Assignments, at home
3- Discussions in the Class
4- Case study report (data collection, Internet search, and reporting)

(iii) Methods of assessment of students numerical and communication skills

s1- Quizzes
s2- Case Study Report
s3- Discussion Groups
s4- Midterm Exams
s5- Final Exam
s6- Group Mini project

5- Student Assessment Schedule:

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>Individual Assignments</td>
<td>15%</td>
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<tr>
<td>2</td>
<td>Lab Projects</td>
<td>30%</td>
</tr>
<tr>
<td>3</td>
<td>Pre-lab Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td>Design Projects (2 @ 12% each)</td>
<td>25%</td>
</tr>
<tr>
<td>5</td>
<td>In-Class Activities &amp; Attendance</td>
<td>10%</td>
</tr>
<tr>
<td>6</td>
<td>Log Book</td>
<td>5%</td>
</tr>
<tr>
<td>7</td>
<td>Final Exam</td>
<td>15%</td>
</tr>
</tbody>
</table>

6- ILO’s Matrix:

<table>
<thead>
<tr>
<th></th>
<th>Teaching Method</th>
<th>Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILO’s</td>
<td>t1</td>
<td>t2</td>
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<tr>
<td>----------------------------------------------------</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
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<tr>
<td>Facts, Concepts, theories</td>
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<td></td>
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<tr>
<td><strong>Cognitive Skills</strong></td>
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<tr>
<td>Apply skills when asked</td>
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<tr>
<td>Creative thinking &amp; Problem solving</td>
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<tr>
<td><strong>Interpersonal Skills and Responsibility</strong></td>
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<tr>
<td>Responsibility for own learning</td>
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<tr>
<td>Group participation, leadership</td>
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<tr>
<td>Act responsibly-personal and professional situations</td>
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<tr>
<td>Ethical standards of behavior</td>
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<tr>
<td><strong>Communication IT and Numerical Skills</strong></td>
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<tr>
<td>Oral and written communication</td>
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<tr>
<td>Use of IT</td>
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<tr>
<td>Basic maths and statistics</td>
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<tr>
<td><strong>Psychomotor &amp; Other Skills</strong></td>
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</tbody>
</table>

**Notes:**

√ Major Responsibility  x Minor Responsibility

**Summary of teaching strategies to be used to develop these cognitive skills**

- t1- Lectures
- t2- Assignments, at home
- t3- Discussions in the Class
- t4- Case study Report (data collection, Internet search, and reporting)
- t5- Mini project (Design - Hardware / Software Development), Supervised
- t6- Summer Training, Supervised
- t7- Collaborative Training, Supervised

**Summary of Assessment Methods of assessment**

- s1- Quizzes
- s2- Case Study Report
- s3- Discussion Groups
- s4- Midterm Exams
- s5- Final Exam
- s6- Group Mini project
D- Student Support:

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

   Two office hours are offered per week.

E- Learning Resources (References):

1- Essential Books (Text Books):
   - Strategies for Creative Problem Solving, H. Scott Fogler and Steven E. LeBlanc, Prentice Hall, 1994, (based on a problem solving heuristic or process)

2- Course Notes:
   Additional course materials will be distributed during the running of concept and labs.


F- Facilities Required for Teaching and Learning

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)
   - White Board, Data Show

2. Computing resources
   All homework assignments **should** be done by utilizing computer facilities. This would involve the use of word processors, spreadsheets, as well as graphic software. Use of the Internet is vital for conducting any technical design. Moreover, oral presentations should be conducted with the aid of presentations tools such as Power Point. In some projects, students may need to use special packages that are available in the Mechanical Engineering Department to carry out their project calculations and simulations or to process their experimental data. Examples of these programs include FLUENT, ANSYS, EES, and MATLAB.

3. Other resources (e.g. If specific laboratory equipment is required, list requirements or attach list)

G- Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching
2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department

3. Processes for Improvement of Teaching

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

**Special Aspects of This Course:**

**Graded Work:**

Graded works in this course include:
1. Individual Homework Assignments
2. Individual Documentation
3. Team Technical Briefings
4. Team Update Reports
5. Final Written Proposal and Presentation
6. Midterm Exam and Final Exam

**GRADING:**

**Exams:** There will be one midterm exam during the semester and a final exam at the scheduled time.

**Individual Documentation:** Each student must maintain a detailed notebook in which they record all of their efforts, important results, conclusions, etc. Each entry must be dated and any important or significant results of ideas must be witnessed by the dated signatures of two other people. Bring notebooks to every class meeting - they will be collected and inspected without prior notification.
Individual Homework Assignments: Specific tasks and/or projects will be assigned during the semester following the topics covered in the class textbook and lectures. These assignments will require several days effort to complete and will be presented formally in engineering report format.

Team Technical Briefings: Each team will prepare and deliver ten-minute technical briefings describing their project work. Students are expected to use appropriate audio-visual aids and to plan and practice their briefings so that material is adequately covered within the time allowed. Students are expected to dress and act professionally for the team presentations. Individual Participation in Briefings: Each student will participate in the formal presentations describing work on projects/assignments. Students will be evaluated by the instructor, TA, and advisors. Each student will also write a self-assessment memo about their presentation.

Team Update Reports: Project work will also be documented in update reports. These update reports will be presented formally in engineering report format.

Final Written Proposal and Presentation: A major objective of the semester’s work will be the preparation of a formal written research proposal for a semester-long project to be accomplished during GE 213 in the following semester. These proposals will be accomplished by design teams. Project final reports will document work accomplished during GE 211 and provide a formal proposal for the continuation of the work in AGE 213.

Each team will present their proposal to the class. These formal presentations will be approximately 15-20 minutes in length with a 5-10 minute period for questions. Students are expected to use appropriate audio visuals and to plan and practice the presentation so that their proposal is adequately covered within the time allowed.

Final Exam:

There will be one Final exam to be held on week sixteenth. There will be no make-up exams. If the student misses the Final exam, he will receive a zero grade on the Final exam.