SYLLABUS

# INTRODUCTION TO COMPUTER AIDED DRAWING (CAD) for MECHANICAL ENGINEERS – EML1533

## 2011-2012 FALL

3 Credits

**Instructor** : Dr. **Aylin YENİLMEZ GÜRKÖK**, Florida International University, Mechanical and Materials Engineering Department, Office #: EC ????, Phone: 305-348-????, E-mail: eml1533@gurkok.net, Web: http://aylin.gurkok.net/

**Course TA** : Siavash Rastkar

| Office Hours | Class Number | Lecture Days | Lecture Hours | Location | Section |
|---|---|---|---|---|---|
| Tuesday 2.00-3.00 p.m., Thursday 2.00-3.00 p.m. | 82086 | Tuesday Thursday | 12:30/1:45 p.m. | Computer Laboratory (EC3239) | UO1 |

**Pre-request** : None

**Text Book** : William E. Howard and Joseph C. Musto, Introduction to Solid Modeling Using SolidWorks 2011, McGraw-Hill, 2011, ISBN-10: 0073375454, ISBN-13: 978-0073375458
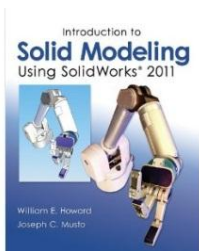
**Reference Books** :
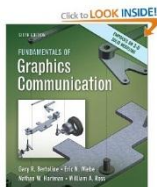
Gary Bertoline, Eric Wiebe, Nathan Hartman, William Ross, Fundamentals of Graphics Communication, McGraw-Hill Science/Engineering/Math; 6 edition (January 13, 2010), ISBN-10: 0073522635, ISBN-13: 978-0073522630

David C. Planchard, Marie P. Planchard, **_SolidWorks 2011 Tutorial_**, SDC Publications; Pap/Cdr edition (February 11, 2011), ISBN-10: 1585036315, ISBN-13: 978-1585036318

Mark N Horenstein, _Design Concepts for Engineers,_ Prentice Hall; 4 edition (March 26, 2009), (ISBN-10: 013606955X, ISBN-13: 978-0136069553)
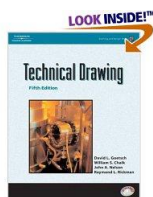
David L. Goetsch, William Chaulk, John Nelson, _Technical Drawing (Drafting and Design),_ Cengage Delmar Learning, 5th Edition, December 22, 2004 (ISBN-10: 1401857604, ISBN-13: 978-1401857608)

| **Objectives** | : This course of study aims; |
| --- | --- |

1. To introduce the fundamentals of technical graphical visualization and communication,

2. To use software to create multi-view and 3-D drawings for mechanical engineering designs,

**Lecture Schedule** :

| | Week of | Contents |
| --- | --- | --- |
| **1** | August 23 | Introduction to Computer Aided Drawing |
| **2** | August 30 | Fundamentals of Technical Graphical Visualization and Communication, Parametric Design and Basic Drawing Functions |
| **3** | September 6 | Part Modeling |
| **4** | September 13 | Advanced Part Modeling |
| **5** | September 20 | 3-D modeling and Multi-view Drawings |
| **6** | September 27 | Part Drawings, Dimensioning and Tolerances |
| **7** | October 4 | Applications of Part Modeling and Drawings |
| **8** | October 11 | Fundamentals of Descriptive Geometry **MIDTERM EXAM 1** |
| **9** | October 18 | Assembly |
| **10** | October 25 | Assembly Drawings |
| **11** | November 1 | Applications of Assembly and Assembly Drawings |
| **12** | November 8 | Mechanism Design, **MIDTERM EXAM 2** |
| **13** | November 15 | Simulation |
| **14** | November 22 | Applications of Mechanism Design |
| **15** | November 29 | Extra Feature of Solid Works, Final Project Proposal |
| **16** | December 6 | **Final Project Presentations!** |

**Assessment** : This course is very time consuming. This is a three credit hours course, so expect to work at least three hours outside of class. To successfully progress through the course, students must understand each of the topics in the order it is presented. Students missing class are still responsible for the material covered in class. Students are expected to comply with all requirements for the class. Drawing assignments and projects will be graded based on content and neatness. Grades are not given, they are earned. You are expected to accept all responsibility for your performance in the class. Filenames should be **YourLastNameFirstName_YourStudentNumber_A#**

| Midterm Exam I (Week 8) | 20 % |
| --- | --- |
| Midterm Exam II (Week 12) | 20 % |
| Homework I (Week 8) | 10 % |
| Homework II (Week 12) | 10 % |
| Assignments <Average of the assignments> | 20 % |
| Quizzes | 5 % |
| Design Project (Week 16) | 15 % |

**Exams (40%)** : There will be two midterm exams in the class, open books and notes. No make-up exam will be given (a grade of zero will be assigned) except for **a verified and written excuse**. The instructor should be informed in advance or no later than 48 hours after the exam in case of an emergency. It is the instructor's discretion to give the make-up exam. Filename should be **YourLastNameFirstName_YourStudentNumber_ME#**

**Homework (20%)** : All homework and project assignments have to be submitted in both printed copy and electronic copy on time. Late homework and projects will have 20% per day penalty. The electronic copies have to email to **eml1533@gurkok.net** with a file name of **YourLastNameFirstName_YourStudentNumber_HW#**

**Assignments (20%)** : Draw all assignments using a Solid Works program which is available in Computer laboratory. You are to stay in the laboratory and work on your PC until they are completed and handed in or the class ends. It is up to each student to complete the work. **No credit will be given for late work**. Assignments will be collected within

the last five minutes of class. **Repeating the assignments is not possible.** The student should print their name clearly on the paper. (**YourLastNameFirstName_YourStudentNumber_A#**)

**The usage of any instant messenger program or cellular phones is not allowed during class hours.**

**Quizzes (5%)**    : Pop-up quizzes will be given in the class without previous announcement, open books and notes. There is no make-up quiz.

**Final Project (15%):** The final project will be presented in class. The design team will be formed by 4-5 members; One of the team members will be selected as a team leader; The team activity schedule will be prepared; The course instructor will be informed about your team, the leader, and the team activity schedule; Otherwise, the design teams will be organized by the course instructor; Progress report will be submitted during the 10th course week.

**Evaluation and overall grading scale:** Final grade will be awarded as following. **However, the instructor may adjust the scale according to the class performance.** The following grading scale is the suggested grading scale. (If the year-end grade average is below 40, the letter grade assigned will be FF.

| Marking System | | | |
|---|---|---|---|
| **A** | 95 - 100 | **C+** | 76.7-79.9 |
| **A-** | 90-94.9 | **C** | 73.3-76.6 |
| **B+** | 86.7-89.9 | **C-** | 70.0-73.2 |
| **B** | 83.3-86.6 | **D** | 60.0-69.9 |
| **B-** | 80.0-83.2 | **F** | Below 60.0 |

**Catalog Description**    : Introduction of technical graphical visualization and communication for mechanical design; knowledge and skills of using a software package to create the ANSI standards multi-view and 3-D drawings.

**Course Objectives**    : This is a fundamental course of CAD designed for freshmen undergraduate students in mechanical engineering. The course provides students,

1.    The basic concepts of mechanical engineering design,
2.    The knowledge and skills of technical graphical visualization and communication,
3.    The technical drawing software will be used in this course to create multi-view and 3-D drawings for mechanical engineering designs following ANSI standards,
4.    The project-based practices will be used to reinforce students' team work skills for their further studies and future professional careers.

**Learning Outcomes**    : In successfully completing this course students will,
1.    Students will gain knowledge and skills for technical graphical visualization and communication, understanding basic concepts of mechanical engineering design.
2.    Be able to use a technical drawing software package to create multi-view and 3-D drawings for mechanical engineering designs following ANSI standards.
3.    They will be reinforced team work skills to be successful working in team projects and in their future professional careers.

**Attendance Policy**    : Attendance is expected at all lectures, although it will not be checked. Proper learning of the course material can only be achieved through regular course attendance and an abundance of time spent completing all of the assigned homework and practicing the skills introduced in this course. Please be aware that the material is cumulative in this class, which means that you should try to make every effort in a timely manner.

**Caution**    : Students are reminded not to treat this course instruction manual as a comprehensive and solely sufficient material for their studies since the purpose of this course manual is not meant to be a substitute for regularly attending classes, reading relevant textbooks, recommended books. The course instruction manual is aimed at providing a quick reference and a brief guidance for the students.

**General Skills**    : The course is designed to give undergraduate engineering student ability to read and write the language of Engineering Graphics. It provides the undergraduate engineering

student with a background in descriptive geometry, orthographic projection, basic dimensioning, auxiliary and section views, and computer-aided engineering graphics. Students are to learn to use a commercial CAD package.

**Academic Dishonesty :** Cheating and plagiarism are serious academic matters and they will be handled by the following policy and by the University policy and will result a final grade of "F" for the course. The case will be reported to the Dean of Students for disciplinary action. No exceptions. Please avoid cheating or any other form of misconduct. If you are having personal problems, come and talk to me.

**Disclaimer** : The course schedule, content, and assignments are subject to modification when circumstances dictate and as the course progresses and mature. If changes are made, you will be given due notice.

**Computer Usage** : Students are required to use software tools such as SolidWorks for the elaboration of the projects and assignments.

**Date** : August 2011

**Homework # 1** Creating parts,

**Homework # 2** Creating an Assembly,

**Design Project:** It is designed as a comprehensive problem. Students are required to create a mechanism which has some rotating parts.

- The design team will be formed by 4-5 **members,**

- One of the team members will be selected as **a team leader,**

- The team activity schedule will be prepared,

- The course instructor will be informed about your team, the leader, and the team activity schedule,

- Otherwise, the design teams will be organized by the course instructor,

- Progress report will be submitted during the $10^{th}$ course week,

- Final design project will be submitted during the $15^{th}$ course week and presented during the last course week ($16^{th}$ course week).

# EML 1XXX Introduction to CAD for Mechanical Engineers
## Department of Mechanical and Materials Engineering Program

**Educational Objectives:** Show the program objectives that are directly supported by this course and briefly describe how each objective is achieved relative to course topics and practices employed in the course.

| Mechanical & Materials Engineering Program - Educational Objectives | Mark X if Aoolies | Description |
|---|---|---|
| I. Broad and in-depth knowledge of engineering science and principles in the major fields of Mechanical Engineering for effective engineering practice, professional growth, and as a base for life-long learning. | X | Lifelong learning is emphasized thorough required hands-on projects involving the need for professional development. The topics, basic concepts of mechanical engineering design as well as technical graphical visualization and communication, are taught as a ladder for students to pursue further knowledge in their study and career. |
| 2. Hands-on experience with state-of-the-art instruments and laboratory techniques to bridge classroom learning with practical, "real-life" problems. | X | Computer as a contemporary technical drawing tool is used for creating technical graphics for mechanical engineering designs. The students will experience of representing "real-life" design idea to a blueprint through hands-on projects. |
| 3. The ability to utilize analytical and experimental methods and modem computer technology for decision making and engineering design and to solve realistic engineering problems. | X | Students will use computer to create a technical graphics for mechanical engineering designs to solve realistic problems. They will bring their ideas for solving mechanical engineering problems to present them in the blueprints. |
| 4. The ability to work effectively with others in a team while simultaneously maintaining independent and creative thought. | X | Students will be reinforced team work skills to be successful working in team projects. Each one is responsible for an assignment of own designed parts, and whole project is completed by assembling them together in the group. |
| 5. The ability to communicate effectively and to articulate technical matters using verbal, written, and graphic techniques. | X | The graphic technique is reinforced as a communication tool for mechanical engineering design. |
| 6. An adequate background to pursue graduate studies in engineering and other fields. | X | This is a fundamental course for mechanical engineering design and technical graphic communication. The knowledge and skills will be used in students' future studies or other engineering fields related to technical graphics. |
| 7. A sense of professional and social responsibility, including a commitment to protect both occupational and public health and safety, developed through consideration of moral, social, and ethical paradigms related to the engineering profession and practice. | | |

**EML 1 X X X Introduction to CAD for Mechanical Engineers**
**Department of Mechanical and Materials Engineering Program**

**Educational Outcomes:** Show the program outcomes that are directly achieved by this course and describe how each outcome is achieved in terms of specific tools employed in this course.

| Mechanical & Materials Engineering Program | Mark X if Applies | Description |
|---|---|---|
| a. Ability to apply knowledge of mathematics, science, and engineering. | X | The knowledge learnt in this course will be applied in mechanical engineering design as well as other engineering fields' related to technical graphics and visualization. |
| b. Ability to design and conduct experiments, as well as to analyze and interpret data. | | |
| c. Ability to design a system, component, or process to meet desired needs. | | |
| d. Ability to function on multi-disciplinary teams. | X | The projects are assigned in multi-disciplinary teams. |
| e. Ability to identify, formulate, and solve engineering problems. | | |
| f. Understanding of professional and ethical responsibility. | X | The results of mistakes in engineering design and production will be emphasized in the topics. |
| g. Ability to communicate effectively. | X | Students are required to present their team work projects in the class. |
| h. Broad education necessary to understand the impact of engineering solutions in a global and societal context. | X | It will be discussed that from an idea to products, from design to manufacturing, the advance of engineering solution will impact our livings. |
| i. Recognition of the need for, and an ability to engage in, lifelong learning. | X | Lifelong learning is an important objective throughout required reading and discussions of ongoing advanced technology and applications. |
| j. Knowledge of contemporary issues. | | |
| k. Ability to use the techniques, skills, and modem engineering tools necessary for engineering practice. | X | The skills of using the computer and technical drawing software are emphasized in this course, and applied to create a technical graphics for mechanical engineering design. |
| I. Knowledge of probability and statistics, including applications to Mechanical Engineering. | X | The statistics knowledge will be applied to quality assurance of the product dimensions and tolerances in the technical drawing. |
| m. Knowledge of mathematics and of basic and engineering science necessary to carry out analysis and design appropriate to Mechanical Engineering. | X | The knowledge of three-dimensional geometry concepts and statistics methods is discussed to understand the standard graphic communication technique and product quality controls. |
| n. Ability to apply advanced mathematics through multivariable calculus and differential equations. | | |