ENME 204 – Introduction to Design with CAD
Spring 2015

Course Description:	Sophomores are introduced to engineering design using the science, mathematics and tools (CAD) from prior courses. The course will cover design specifications, design analysis (including basic kinematics), performance predictions, design changes, and final design. Students will be required to make written and oral presentations and produce a final prototype with design report through the term project.
Prerequisites:	ENES101, ENES220 or equivalent
Class Schedule:	Lecture: Mon and Wed 9:00-9:50 a.m. Public Policy 105; **AND** Lab: Tue 2:30-4:20 p.m. or Tue 4:30-6:20 p.m. or Mon 2:30-4:20 p.m. (ENG114)
Course Instructor:	Dr. Soobum Lee ENG214; Phone: (410) 455-3314 E-mail: sblee@umbc.edu Office Hours: Mon 10:00-11:00 a.m. or by appointment
Teaching Assistant:	Saman Nezami ENG230B E-mail: saman2@umbc.edu Office Hours: TBD; check Blackboard Stephanie Der E-mail: der2@umbc.edu Office Hours: TBD; check Blackboard Juliette Sardin E-mail: jsardin1@umbc.edu Office Hours: TBD; check Blackboard
Textbook:	Ullman, D., *The Mechanical Design Process*, 4th edition, McGraw-Hill Inc., New York, 2010. (ISBN 978-0-07-297574-1)
Reference book:	Norton, R. L., *Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines*," 4th edition, McGraw-Hill Inc., New York, 2004. (ISBN 0-07-121496-8) David C. Planchard, *SolidWorks 2014 Reference Guide*, SDC Publication, 2014. (ISBN: 978-1-58503-843-5)
Course Objectives:	1. Understanding of the design process. 2. Ability to communicate in both oral and written forms. 3. Ability to identify and use different sources of information. 4. Understanding of basic kinematics and engineering economics.

5. Ability to use 3-D CAD (SolidWorks).
6. Ability to perform analysis and design, and use the computer as a tool.

Topics Covered in ENME204 Lectures:

The design process – Where does a design start? The "needs" statement? Solving a problem to a set of specifications. Analysis. Modeling.
Communication- The design drawing. Oral reports. Written reports.
Information sources- Library. Patent Searches. Trade and scientific journals. Internet.
Materials Selection- Which material is best for the job? Best for manufacture?
Economics- Cost of Design. Cost of Production. Overhead.
Design Analysis- How do we know the design will work? Does the design fulfill the needs/specifications? How to make the design more efficient, effective, and inexpensive.
Computers as Tools- When to use and especially when to trust the computer. Types of design programs.

Contributions:

Based on the criteria proposed by the ABET 2000 Program Outcomes and Assessment, students in this course will embark on a learning journey seeking to develop:

- an ability to apply knowledge of mathematics, science, and engineering
- an ability to design a system, component, or process to meet desired needs
- an ability to function on a multi-disciplinary team
- an ability to identify, formulate and solve engineering problems
- an understanding of professional and ethical responsibility
- an ability to communicate effectively
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Assessment:

The students will be evaluated through design projects, laboratories, homework, and quizzes/exams. Lab reports and homework that are turned in late will receive a 25% per day penalty starting immediately after the time that the assignment is due. Pieces of the design project that are turned in late will NOT be accepted.

30% – Quizzes/Exams (1 lecture, 1 SolidWorks)
- 1 lecture 20% (Quizzes included, ?%)
- 1 SolidWorks 10%

30% – Design Project (presentation, final report, prototype, peer evaluation)
- Final Presentation (10%)
- Final Report (5%)
- Prototype (12%)
- Peer evaluation (1.5% + 1.5%)

20% – Lecture Homework
- Progress Reports (12%) – Plan/QFD/Design Analysis

Midterm Presentation (8%)

20% – Labs

CAD homework (15 %)

Reverse Engineering (5%)

The grading will follow the usual weighted scoring: A (weighted sum 90.0%~); B (80.0~89.9%); C (70.0~79.9%); D (60.0~69.9%); and F (~59.9%).

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes full responsibility of as a participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty. Academic misconduct could result in disciplinary action that may include, but is not limited to a grade of zero on the particular work, a grade of F in the class, suspension or dismissal. To read the full Student Academic Conduct Policy, consult the UMBC Student handbook, the Faculty Handbook, or the UMBC Policies section of the UMBC Directory. See also http://www.umbc.edu/provost/AcademicIntegrity/Honorcode.htm

MECHANICAL ENGINEERING REPEAT POLICY

At UMBC, students may not register for a course more than two times. They are considered registered for a course if they are enrolled after the end of the schedule adjustment period. Students may petition the Office of Undergraduate Education for a third and final attempt of a course taken at UMBC or another institution, however the Department of Mechanical Engineering will not support petitions to repeat required lower-level courses for the purpose of continuing in the major.

DESIGN PROJECTS

Part of the course will be devoted to student design projects. There will be one design project during the course of the semester. At the start of the project, students will receive a detailed description of the project and an itemized list of when sub-segments of the project are due. The students will work in groups. The project will require a complete written report as well as a physical product. The project will also require a short, oral presentation.

LABORATORY SESSIONS

The laboratory sessions are intended to expose the student to both SolidWorks and actual design problems and allow the students to work on solving those problems. The labs will be composed of both "hands-on" projects and computer projects.

COMPUTER AIDED DESIGN

1. The use of programs/tools will not be taught during lecture time.

2. Students will be required to learn with tutorials, laboratory sessions (with TA or Profs) or use prior knowledge (i.e., ENES101).

SCHEDULE:

Week	Module	Lecture Topic	Reading	Lab.
1/26	1-2	Introduction Why study design process?	Ch. 1	NO LAB
2/2	3-4	Project planning QFD **Teammates Assignment**	Ch. 2/3 Ch. 5/6	User Interface, Simple Object Creation I
2/9	5	Discussion Kinematics/Mechanism I	Ch. 4	Simple Object Creation II
2/16	6-7	Kinematics/Mechanism II	-	Features **Lab assignment 1**
2/23	8-9	Kinematics/Mechanism III **Design Proposal Due**	-	Datum Planes
3/2	10-11	Kinematics/Mechanism IV	Ch. 7, 8	Patterns, Sweeps, Blends
3/9		Kinematics/Mechanism VI Lecture Quiz/Discussion **QFD Due**	-	Engineering Drawings
3/16		SPRING BREAK	-	SPRING BREAK **Lab assignment 2**
3/23	12-13	Concept Generation Design Matrix/TRIZ Product Generation	-	Assemblies **Lab assignment 3**
3/30		**Progress presentation** **Peer Review I**	Ch. 9	**Lab. Exam.**
4/6	14-15	Computer Aided Analysis	-	Reverse engineering
4/13	16-17	Material/Manufacturing Information Session for Exam	Ch. 10	Reverse engineering
4/20	18-19	Robust Design I-II **Design Analysis Due**	-	Reverse engineering **R-Engineering Due**
4/27		Cost Analysis **Lecture Exam (29th)**	-	Project Prototyping
5/4		Presentation skill Invited Lecture (IP)	Ch. 12.5	Project Prototyping
5/11		**Final presentation**	-	**Final presentation**
5/18		**Demo (9 am), Final Report,** **Peer Review II**	-	

Feb 6: Last day for Undergraduates to drop w/o a grade
May 12: Last day of the class, Tuesday
May 14~21: Final period

Prepared by Dr. Soobum Lee, April 13, 2015