EML 5045: Computational Methods for Design and Manufacturing
Fall 2009

Basic Information
Catalog Description: Theory, algorithms and methodology for geometric and solid modeling, feature-based design, and parametric models. Applications to product design, rapid prototyping, and manufacturing.
Catalog Information: Credits 3, Prerequisite: Permission of instructor
Instructor: Dr. Ashok V. Kumar, Associate Professor, Department of Mechanical and Aerospace Engineering. Office: 106 MAE-C, Phone: 392-0816, Email: akumar@ufl.edu

Reference books:

Software: One of the following must be used by students:
Pro/Engineer Wildfire 4.0 is available for purchase at: http://www.journeyed.com/item/273945/Wildfire/86454903
AutoDesk Inventor: http://students.autodesk.com (Free download)
SolidWorks: http://www.solidworks.com/

Course objectives
The objective of this course is to teach the fundamental computational methods available to assist in design and manufacturing. The course will expose the students to the geometric modeling fundamentals, including curve, surface and solid model representation. In addition, feature-based approach for creating parametric models of mechanical components will be taught. Application of these techniques to product design, engineering analysis, rapid prototyping and manufacturing will be emphasized. The main topics covered in the course are outlined below:
1. Solid modeling: Constructive Solid Geometry, Boundary-Representation
2. Data structures for representing B-Reps
3. Variational Geometry and Constraint Management
4. Feature-based Parametric models
5. Design intent and model history
6. Introduction to Differential Geometry
7. Analytical Curves
8. Bezier and B-spline curves
9. Analytical Surfaces
10. B-spline surfaces
11. Assembly representation, modeling and design
12. Drawing generation
13. Computer Aided-Manufacturing
14. Rapid Prototyping

**Course assessment**

Homework: Assignments / Projects will be posted on the web.
Grading: Examinations = 60%; Assignments = 20%; Final Project = 20%.

**Other course information**

**Attendance:** is very important since some of the material covered in class is not in the reference books. If you have to miss a class, arrange to get notes from a classmate and meet with TA or instructor during office hours to clarify any material you could not understand.

**Make-up Policy:** No late assignments will be accepted. Makeup exams are not normally allowed. If you cannot attend an exam or cannot meet a due date, you must contact the instructor prior to the exam or due date. Arrangements will be made for students on a case by case basis.

**Honesty Policy** – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

**Accommodation for Students with Disabilities** – Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

**UF Counseling Services** – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

**Software Use** – All students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.