

Western University
Faculty of Engineering
Department of Mechanical & Materials Engineering

MME 9727 – Computer-Aided Design and Manufacturing

COURSE OUTLINE – 2012-2013

OBJECTIVES: This course introduces modern Computer-Aided Design and Manufacturing (CAD/CAM) technologies as well as related advances in Computer-Aided Inspection (CAI). Students will develop in-depth knowledge and understanding implementations and underlying principles of these advanced technologies through the lectures and hands-on term projects.

PREREQUISITES: Graduate student standing or permission from the instructor

ANTIREQUISITES: None

TOPICS:

1. Parametric representation of curves and surfaces: Hermite, Bezier, B-Spline, NURBS formulations
2. Three-axis and five-axis sculptured surface machining: machining error and efficiency, tool path generation, cutter orientation determination, tool path discretization, machine tool kinematics, post-processing
3. Modern metrology: coordinate measuring machine (CMM), error analysis of measured freeform surfaces
4. Novel development trends in CAD/CAM technology

CONTACT HOURS: 2 lecture hours per week, 2 laboratory hours per week, half course

TEXTBOOK(S): None

REFERENCES:

1. Mastering *CAD/CAM*, Zeid, I., McGraw-Hill, 2005
2. Computer-Aided Manufacturing, T.C. Chang, R.A. Wysk, H.P. Wang, Prentice Hall, 3rd edition, 2005
3. Introduction to Computer Numerical Control (CNC), J.V. Valentino, and J. Goldenberg, Prentice Hall, 5th edition, 2013
4. Edgcam 11.0 for Manufacturers, S. Tickoo, CAD/CIM Technologies, 2007

EVALUATION: The final grade in the course will be determined based on the evaluation formats detailed below.

The **tentative** schedule of the different evaluation formats used throughout the course is outlined in the following table:

Evaluation Format	Type	Weight	Handed out	Deadline
Assignment	Individual	20%	Week of Sep. 24 th	Week of Oct. 29 th
CAD Project	Individual	25%	Week of Oct. 1 st	Week of Dec. 3 rd
Hands-on Project	Team	35%	Week of Oct. 15 th	Week of Dec. 17 th
Presentation	Individual	20%	Week of Oct. 29 th	Week of Nov. 29 th

Evaluation formats:

1. *Assignment*
Topic: Model a part exhibiting one or more freeform surfaces by means of a CAD system of your choice.
Deliverables: CAD part file.
2. *CAD Project*
Topic: Create a Matlab program capable to generate, plot and/or modify B-Spline and/or NURBS curves (surfaces).
Deliverables: On-screen demonstration and source code(s).
3. *Hands-on Project*
To be selected between:
 - 3a. *CAM Project*

Topic: Machine a part exhibiting one or more freeform surfaces on Fadal 4020 VMC. The tool paths will be generated prior to machining by means of available CAM software (Edgecam).
Deliverables: Practical demonstration, project report, machined part.

3b. *CAI Project*

Topic: Inspect a part to be provided by means of DEA Swift direct computer controlled coordinate measuring machine (CMM).
Deliverables: Practical demonstration, project report.

4. *Presentation*

Topic: Review and present current and future development trends in CAD/CAM technology. A list of suggested topics and associated references will be provided.
Deliverables: Class presentation, slides.

INSTRUCTOR:

Professor R. Tutunea-Fatan
Office: SEB 2063A. 519-661-2111, ext. 88289
Email: rtutunea@eng.uwo.ca
Office Hours: By appointment and/or drop in

ATTENDANCE:

Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, will be reported to the Associate Dean (Graduate) (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Associate Dean (Graduate), the student will be debarred from taking the regular examination in the course

CONDUCT:

Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others.

SICKNESS:

Students should immediately consult with the instructor or Associate Chair (Graduate) if they have problems that could affect their performance in the course. The student should seek advice from the Instructor or Associate Chair (Graduate) regarding how best to deal with the problem. Failure to notify the Instructor or the Associate Chair (Graduate) immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

ACCESSIBILITY:

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation

PLAGIARISM/

ACADEMIC OFFENCES: Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage of text from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence. Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_grad.pdf

NOTICES:

Students are responsible for regularly checking their Western email and notices posted on Instructors' doors.

NOTE:

The above topics and outline are subject to adjustments and changes as needed.