

Western University  
Faculty of Engineering  
*Department of Mechanical & Materials Engineering*

**MME 9650 – Selected Topics: Reverse Engineering of Physical Objects**

**COURSE OUTLINE – 2013-2014**

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**OBJECTIVES:** Students are introduced to the concept of reverse engineering. The focus of the course is placed on advanced computer-aided design (CAD) techniques as involved in the generation of 3D digital models from existing physical objects. These 3D digital models are the main input to various computer-driven manufacturing processes, such as 3D printing. Topics include contact and non-contact data acquisition techniques, data type and exchange formats, advanced visualization and surfacing, and additive manufacturing technologies.

**PREREQUISITES:** Graduate student standing or permission from the instructor

**ANTIREQUISITES:** None

**TOPICS:**

1. Introduction
2. Data acquisition techniques
3. Data types and data exchange formats
4. Parametric data reconstruction
5. Additive manufacturing technologies

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

**TEXTBOOK(S):** None

**REFERENCES:**

1. Raja V., Fernandes, K.J., *Reverse Engineering, an Industrial Perspective*, Springer-Verlag, 2008.
2. Zeid I., *Mastering CAD/CAM*, McGraw-Hill, 2005.
3. Tickoo S., *NX 8.5 for Designers*. CADCIM Technologies, 2013.
4. Zeid I., *Mastering SolidWorks, the Design Approach*, Prentice Hall, 2011.

**EVALUATION:** The final course grade will be determined as listed below:  
Deadline dates for assignments, projects, presentations and examinations are determined according to the **tentative** schedule as follows:

Assignments	20%
Computer workshops	12%
Projects	40%
Presentation	13%
Quiz	15%

Term coursework will be carried out according to the following **tentative** schedule:

<b>Evaluation Method</b>	<b>Weight</b>	<b>Assigned</b>	<b>Deadline</b>
Workshop 0	0	Jan. 7	Jan. 11
Workshop 1	2%	Jan. 14	Jan. 18
Workshop 2	2%	Jan. 21	Jan. 25
Workshop 3	2%	Jan. 28	Feb. 1
Workshop 4	2%	Feb. 4	Feb. 8
Project 1	20%	Feb. 4	Mar. 1
Workshop 5	2%	Mar. 4	Mar. 8
Workshop 6	2%	Mar. 11	Mar. 15
Assignment 1	5%	Mar. 11	Mar. 25
Project 2	20%	Mar. 11	Apr. 10
Assignment 2	15%	Mar. 25	Apr. 10
Presentation	13%	Mar. 11	TBD (mid Apr.)
Quiz	15%	TBD (late Apr.)	

**Coursework topics:**

1. Workshop 0: Introduction to the preferred CAD system
2. Workshop 1: Feature modeling
3. Workshop 2: Modeling of curves
4. Workshop 3: Surfacing techniques; surface quality assessment
5. Workshop 4: Visualization and rendering techniques
6. Workshop 5: CT to polygonal mesh data
7. Workshop 6: Direct modeling techniques
8. Assignment 1: Data type and data exchange capabilities
9. Assignment 2: Parametric representation of curves
10. Project 1: Automated and user-driven reconstruction of parametric data
11. Project 2: Reverse engineering of objects delimited by class A surfaces
12. Presentation: Reverse engineering case study

**INSTRUCTOR:** Professor R. Tutunea-Fatan  
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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](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.