

**The University of British Columbia**  
**Faculty of Applied Science**  
*Department of Mechanical Engineering*

## **MECH 491 – “Computer-Aided Manufacturing”**

3 Credits / [2-2\*-0]

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**OBJECTIVES:** This course focuses on the introduction of modern computer-aided manufacturing technologies as well as the related computer-aided geometric modeling methods. Students will develop practical knowledge and understanding of the applications, underlying mathematical principles, and limitations of these technologies through lectures and laboratory tutorials/projects.

**PREREQUISITE:** MECH 392

**TOPICS:**

1. CNC Machine Tool Basics and Milling Operations
2. NC Part Programming
3. Parametric Representation of Curves and Surfaces
4. Sculptured Surface Machining: Three-Axis and Five-Axis

**LECTURES:** 2 lecture hours per week – Tuesdays, 4:00-6:00 pm, CEME 1215

**LABS:** 10 laboratory sessions – Thursdays, 4:00-6:00 pm, PACE Lab (ICICS X060)

**REFERENCE TEXTS:**

1. Zeid, I., *Mastering CAD/CAM*, McGraw-Hill, 2005
2. Lee, K., *Principles of CAD/CAM/CAE Systems*, Addison-Wesley, 1999

**EVALUATION:** The course grade will be determined according to the following:

Assignments	8%
Laboratory Tutorials	2%
Project #1 – Individual	15%
Project #2 – Group	15%
Quiz (closed book)	10%
Final Examination (closed book)	50%

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**NOTE:** The items listed above are subject to adjustments and changes as needed.

## MECH 491 Lecture & Laboratory Schedule

Week	Lecture <sup>1</sup>	Date	Topic	Lab <sup>2</sup>	Date	Topic
1	1	Jan. 6	Course overview			
	2	Jan. 6	CAM/NC/CNC			
2	3	Jan. 13	Machine tool basics	1	Jan. 15	Basic Concepts in NX
	4	Jan. 13	Milling operations			
3	5	Jan. 20	NC part programming – 1	2	Jan. 22	Sketch Basics & Feature Modeling
	6	Jan. 20	NC part programming – 2			
4	7	Jan. 27	3D modeling schemes – 1	3	Jan. 29	Curves
	8	Jan. 27	3D modeling schemes – 2			
5	9	Feb. 3	Parametric curves – 1	4	Feb. 5	Free Form Modeling – 1
	10	Feb. 3	Parametric curves – 2			
6	11	Feb. 10	Parametric curves – 3	5	Feb. 12	Free Form Modeling – 2
	12	Feb. 10	Parametric curves – 4			
7	<b>Midterm Break: February 16 – 20</b>					
8	13	Feb. 24	Parametric curves – 5	6	Feb. 26	Free Form Modeling – 3
	14	Feb. 24	Parametric curves – 6			
9	15	Mar. 3	Parametric curves – 7	Project #1		
	<b>Quiz: March 3</b>					
10	16	Mar. 10	Parametric surfaces – 1	Project #1		
	17	Mar. 10	Parametric surfaces – 2			
11	18	Mar. 17	Machine tool control basics	7	Mar. 19	Cavity Milling
	19	Mar. 17	Accuracy and repeatability			
12	20	Mar. 24	Milling operation setup	8	Mar. 26	Surface Contouring
	21	Mar. 24	CAD/CAM part programming			
13	22	Mar. 31	Tool path generation – 1	Project #2 & Drop-in Sessions		
	23	Mar. 31	Tool path generation – 2			
14	24	Apr. 7	Tool path generation – 3	<b>Shop Machining Sessions</b>		
	25	Apr. 7	Review			
<b>Final Exam: April 14 – 28</b>						

<sup>1</sup> Tuesdays, 4:00-6:00 pm, CEME 1215

<sup>2</sup> Thursdays, 4:00-6:00 pm, PACE Computer Laboratory (ICICS X060)