



COURSE INSTRUCTOR: Robert Fuerst, CAWP 2937A, Tel: 604-822-0034, E-mail: robert.fuerst@ubc.ca

OVERVIEW:

This course in CAD/CAM is directed towards students preparing to work as technical professionals and managers of wood product processing operations. The course will cover:

- How CNC machines function, including the major mechanical and control components.
- The development and future of CNC machining.
- How CNC machines are operated and used.

Much of the learning will result from “hands-on” experience operating and programming CNC controlled routers using commercially available CAD and CAM software. An emphasis will be placed on the synthesis of the skills, information, and ideas required for managerial decision making.

LEARNING OBJECTIVES:

Upon successful completion of the course, the student will be able to:

- Summarize the history of CNC machining
- Describe the major mechanical and control components of a CNC machine and their functions.
- Describe the design and function of common CNC routers
- Safely operate a CNC router
- Program a CNC router machine and edit programs using common G and M code commands
- Create a CNC routing program from an AutoCAD drawing using a CAM program
- Choose and design an appropriate clamping mechanism for CNC routing
- Create a machining program using several typical commercially available programs
- Design parts suitable for CNC machining
- Choose appropriate cutting tools
- Define and manage the operational changes needed to integrate a CNC into a manufacturing operation
- Know the links between CNC machining tools and Just-In-Time manufacturing.
- Create a budget for the purchase, operation, and maintenance of a CNC machine and calculate financial feasibility.

CLASS LOCATION:

Lectures	Monday, Wednesday, Friday, 15:00 to 16:00	Rm: (Case room # 2916 CAWP)
Sect. 1	Tuesday, 09:00 to 12:00	Rm: (Comp Lab, # 2942 CAWP)
Sect. 2	Thursday, 09:00 to 12:00	Rm: (Comp Lab, # 2942 CAWP)

GRADING POLICY:

- Mid Term, 30%
- Labs 30%
- Final 35%
- Participation 5%(See below)

The passing mark in MECH 492 is 50%. All labs must be attendant and successfully completed to pass the lab section of this course.



TEXTBOOK:

No text assigned.

References:

- Lin, S.C. Jonathon and Shiue, F.C. Tony, *Mastercam Version 7*, Scholar's International Publishing Corp. Ann Arbor, Michigan, 1998.
- McMahon, C. and Brown, J., *CAD/CAM Principles, Practices and Manufacturing Management*, 2nd ed., Addison-Wesley, Harlow, England, 1998.
- Lee, K., *Principles of CAD/CAM/CAE Systems*, Addison-Wesley, Reading, Massachusetts, 1999.
- Susnjara, K., *Three Dimensional Trimming and Machining; The Five Axis CNC Router*, 1st ed., Thermwood Corp., Dale, Indiana, 1999.
- Susnjara, K., *Furniture Manufacturing in the New Millennium*, 1st ed., Thermwood Corp., Dale, Indiana, 1998.
- Susnjara, K., *The Furniture Network, A New Furniture Industry*, Thermwood Corp., Dale, Indiana. (A free copy can be downloaded from:
http://www.thermwood.com/Books_and_Multimedia/The%20Furniture%20Network%20Book.pdf)
- Utz, J, and Cox, W. Robert, *Inside Pro/ENG; The Professional Users Guide to Designing with Pro/ENGINEER*, 4th ed., OnWord Press, Santa Fe, NM. 1997

LABS: Labs will be conducted using the CNC routers in the machine shop at the Centre for Advanced Wood Processing as well as 2-D and 3D CAD programs, and AutoCAD.

READING ASSIGNMENTS:

Reading assignments will be given to reinforce lecture topics and promote classroom discussion. 10 PERCENT PER DAY WILL BE DEDUCTED FOR LATE ASSIGNMENTS. No assignment will be accepted more than one week after the due date.

STUDY GROUPS:

Labs will be done in assigned study groups. Students will be strongly encouraged to setup and participate in informal study groups to complete other assignments. Unless otherwise specified, one lab report will be submitted per group. All group members attending the lab will receive the same grade for the report. Students not attending the lab will not receive credit for the report. All students will be expected to master the learning objectives of each lab and all labs must be completed to pass the course.

SAFETY:

Students shall learn and demonstrate knowledge of safe and proficient machine operation before they operate any of the CNC machines. A policy of zero tolerance for safety infractions will be strictly enforced and students found operating the machines in an unsafe manner will be denied operating privileges which will automatically mean failing the course. If any issues of safety arise students will be able to ask for clarification or further instruction without penalty.