

FNR 48410 - Sustainable Furniture Design for CNC Manufacturing

COURSE CONTACT INFORMATION:

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COURSE SUBJECT ABBREVIATION AND NUMBER: FNR 48410

COURSE TITLE: Sustainable Furniture Design for CNC Manufacturing

COURSE CREDITS AND INSTRUCTIONAL TYPE: Sem 1. 3 Cr. Lec 2, Lab 3.

Teaching Assistant: Daniel Bollock, Laboratory Technician, danbollock@purdue.edu
Office hours: by appointment
Weekly Format: Studio – Monday at 9:30 am, FORS 216
Studio – Wednesday at 9:30 am, FORS 216
Laboratory - by appointment

COURSE DESCRIPTION:

The course objective is to familiarize students with Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), CNC router operation, rapid prototyping, basics of secondary wood products manufacturing, and principles of sustainable product development.

Textbooks:

The Furniture Fabrication Factory. 2000. K. J. Susnjara. Thermwood Corporation. (One copy is on reserve in instructor's office. Provided by instructor free of charge upon request).

Wood Handbook: Wood as an Engineering Material. 1999, Forest Products Society, Reprinted from Forest Service, U.S. Department of Agriculture. On-line version is available at:
<http://www.fpl.fs.fed.us/documnts/FPLGTR/fplgtr113/fplgtr113.htm>

(One copy is on reserve in instructor's office. See instructor about ordering a hard copy if desired).

Furniture Manufacturing Equipment. 1987, B.L. Clark, T. A. Ekwall, C. T. Culbreth and R. Willard. North Carolina State University, Department of Industrial Engineering. (One copy is on reserve in instructor's office. See instructor about ordering a hard copy if desired).

Furniture Manufacturing Processes. 1981, A. L. Prak and T.W. Myers. North Carolina State University, Department of Industrial Engineering. (One copy is on reserve in instructor's office. See instructor about ordering a hard copy if desired).

Class Attendance:

You are required to attend all lectures and laboratories. It is the student's responsibility to know what was covered (including notes, handouts and homework) in class during any absence. Contact instructor if you anticipate extended absence. Unexcused absences will reflect negatively on your grade.

Cost of Materials:

While limited supply of materials and tools will be available free of charge, students are expected to pay for cost of custom tools and materials required to complete their projects.

Grading:

% of grade

Project 1	10
Project 2 (Final)	40
Poster	20
Exhibit Presentation	20
Attendance	10

Grade	Range (%)
A+,A	93-100
A-	90.0 - 92.9
B+	87.0 - 89.9
B	83.0 - 86.9
B-	80.0 - 82.9
C+	77.0 - 79.9
C	73.0 - 76.9
C-	70.0 - 72.9
D+	67.0 - 69.9
D	63.0 - 66.9
D-	60.0 - 62.9

F	< 60.0
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Student grades, status and progress can be discussed at any time upon request of either the student or the instructor. Grade appeal procedures are available by university policy.

WARNING: No assignments will be accepted late and no make-up exams will be given unless arrangements are made with the instructor prior to the due date of the assignment or exam.

Academic Integrity:

Your work in this class should be your own. Cheating on quizzes and exams and plagiarism will not be tolerated.

The student is obligated to solve home problems on his own; however, assistance (working together) is legal and sometimes necessary for learning efficiency. Sloppy repeat of another person's errors will not be overlooked.

The penalty for any form of academic dishonesty, cheating, or plagiarism is "F" for the course. Additional disciplinary penalties (including expulsion from Purdue University) may be imposed as stipulated in Part 5 of the University Regulations bulletin. Please refer to the document describing plagiarism and how to avoid it that is attached to the syllabus.

What is Plagiarism?

The Council of Writing Program Administrators states that plagiarism "occurs when a writer deliberately uses someone else's language, ideas, or other original (not common knowledge) material without acknowledging its source". Thus, whenever a person chooses to repeat the exact words written by another author, that person must mark them with quotation marks and provide a citation to the original source. Two excellent sources of additional guidance are:

1. Michael Harvey, *The Nuts and Bolts of College Writing* (Hackett Publishing Co.)
2. Gordon Harvey, *Writing with Sources: A Guide for Students* (Hackett Publishing Co.)

Use of Electronic Devices:

Use of laptop computers, cell phones, pagers, calculators, iPods, and other electronic devices is not permitted in class. Electronic devices may be brought with you to class, but they are to be closed and off/silent during the class. Repeat offenders will be marked as absent and lose corresponding attendance points.

Campus Emergency policy:

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in this course: my email address: gazo@purdue.edu, and my office phone: 494-3634. In addition, you can go to Purdue's home page (<http://www.purdue.edu>) for emergency information and updates.

Studio:

Monday meetings are devoted to discussing functionality, strength, and manufacturability components of your project design. At the beginning of the class, a topic is introduced and then it is followed by group critique of each student's project with respect to a given topic. List of topics follows.

- Designing for Wood (Moisture content, Shrinkage, Joints, Strength)
- CAD Process (Computer Aided Design)
- CAM Process (Computer Aided Manufacturing, CAD/CAM integration)
- CNC Router (Operation Overview)
- CNC Router (Programming, converting geometry)
- CNC Router (Programming – toolpaths)
- CNC Router (Part hold-down)
- CNC Router (Machining parameters and tools)
- Sanding
- Assembly
- Finishing

Wednesday meetings are devoted to discussing aesthetic and sustainability aspects of your project design followed by a group critique of each student's project.

- Design form
- Material selection
- Material utilization, waste
- End-of-life disposal
- Environmental considerations

Laboratory:

<u>Week</u>	<u>Topic</u>
1	Shop safety
2	Project 1 (CNC router introduction)
3	Project 2 (design ideas)
4	Project 2 (sketches)
5	Project 2 (CAD drawings)
6	Project 2 (CAD drawings) <i>(October Break)</i>
7	Project 2 (MasterCam, toolpaths)
8	Project 2 (MasterCam, toolpaths)
9	Project 2 (CNC machining)
10	Last week to work on CNC router (CNC machining)
11	Sanding
12	Assembly <i>(Thanksgiving weekend)</i>
13	Finishing
14	Last day to turn in Project 2 and poster

