BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY
Manufacturing, Electronics & Industrial Processes
Program: Mechanical Engineering Technologies
Option: Manufacturing Technology

Course Outline

MANU 4490
Manufacturing Project

Start Date: January 2006 **End Date:** May 2006

Course Credits: 4.0 **Term/Level:** 4

Total Hours: 60

Total Weeks: 20

Hours/Week: 3 **Lecture:** **Lab:** 0 **Shop:** 3 **Seminar:** 0 **Other:** 0

Prerequisites

Course No.	Course Name
MANU 3310	Material Removal Process
MANU 3312	Computer Aided Manufacturing
MANU 3314	Tool Design
COMM 2269	Technical Communication 2 – co-requisite

MANU 4490 is a Prerequisite for:

Graduation

Course Calendar Description

This course allows students to solve problems that local industry has encountered. Generally this will encompass the design and manufacture of specialized equipment using CAD/CAM techniques, CNC machine tools and conventional machine tools.

Course Goals

- To apply the skills and knowledge obtained during the program to the identification and solution of a practical industrial problem.

Evaluation

Written Proposal	10%
Oral Proposal	10%
Progress	15%
Project Deliverables	30%
Final Oral Presentation	15%
Final Written Report	20%
TOTAL	100%

Course Learning Outcomes/Competencies

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

- Apply the principles of manufacturing engineering to a practical industrial problem.
- Work as a member of a team on a practical industrial problem.
- Conduct a needs analysis to clearly establish the project objectives.
- Establish manufacturing considerations.
- Develop alternative solutions.
- Select the solution to be implemented.
- Prepare status reports and communicate progress to the client and project supervisor.
- Apply the principles of project planning and scheduling to the solution of a practical industrial problem.
- Prepare a final report documenting the project and analyzing the results.

Course Content Verification

I verify that the content of this course outline is current, accurate, and complies with BCIT Policy.

David Lowe — Authoring Instructor

January 6/06 — Date

I verify that this course outline has been reviewed.

Program Head/Chief Instructor

Jan 6/06 — Date

I verify that this course outline complies with BCIT policy.

Dean/Associate Dean

2006/01/04 — Date

Note: Should changes be required to the content of this course outline, students will be given reasonable notice.

Instructor(s)	Office No.:	Phone:	Office Hrs.:	E-mail Address:
Dave Lewis	SW9 – 201P	432-8925	By appointment	dlewis@bcit.ca
Brian Ennis	SW9 - 202	451-6830	By appointment	bennis@bcit.ca

Learning Resources

Text(s):

- None

Equipment:

- Supplies and equipment as required by the project

Protective Apparel:

- Safety glasses and steel toed boots

Policy Information for Students

Assignments: Late reports or projects may be devalued 10% per day late. Reports and projects must be worked on equally by all members of the project group.

Ethics: BCIT assumes that all students attending the Institute will follow a high standard of ethics. Incidents of cheating or plagiarism may, therefore, result in a grade of zero for the report or project for all parties involved and/or expulsion from the course.

Illness: A doctor's note is required for any illness causing you to miss a report deadline.

Attempts: Students must successfully complete a course within a maximum of three attempts at the course. Students with two attempts in a single course will be allowed to repeat the course only upon special written permission from the Associate Dean. Students who have not successfully completed a course within three attempts will not be eligible to graduate from the appropriate program.

Course Outline Changes: The material or schedule specified in this course outline may be changed by the instructor. If changes are required, they will be announced in class or through your my.bcit email.

Advancement: Students who fail three or more courses in a term cannot advance to the next term and may be asked to discontinue from the program.

Assignment Details

All reports should be typed, neat and well organized. Any drawings or sketches must follow standard engineering graphics practice. All reports should include the Date, Course Number and the names of all of the students in the group, the Technology and the Set.

Week of/ Number	Outcome/Material Covered
1	- Project Guidelines explained to students
1 - 2	- Students meet with project advisor to determine the nature of the project, the scope of the project, the members of the project team and the project deliverables.
4	- Written project proposal submitted for approval.
4 – 5	- Students give an oral presentation on their project proposal and the status of the project at the time of presentation. **All students must attend**. This will be a 10-minute oral presentation followed by a 5 minute question period. Oral presentations will be held in conjunction with COMM 2269.
3 – 17	- Student groups work independently on their project. Progress reports are to be handed in on the following dates: o February 27 o April 17 In addition, this year BCIT will be having their bi-annual Open House – April 7th and 8th. It is expected that significant progress will have been made prior to Open House in order to display the project to the public.
Week of May 8	- Oral presentation of the project results. **All students must attend**. Details on the requirements of this presentation will be given later.
May 15	- Final report is to be handed in. Detailed information on the requirements of the report will be given in COMM 2269.

In order to try to facilitate better communication between the project group members, the project sponsors and the instructors, a new software program known as "Lotus QuickPlace" will be used this year. This web based collaboration tool will allow students to work on their designs and manufacturing plans remotely from BCIT and serve as a central repository for all project related documentation. Individuals in a group will be able to store their work in a secure place that only other members of the group or project sponsors and instructors will be able to access. Project files such as schedules, drawings, process plans and CNC files are examples of the types of project documentation which will be stored in your QuickPlace room. Email between the project members and instructors is also facilitated.

Instructions on the use of Quickplace will be given in the next couple of weeks.

MANU 4490 - Manufacturing Project - Guidelines

In the Winter/Spring term, one of your courses will be the Manufacturing Project. It runs from the beginning of January until the beginning of May. In order to complete the project on time, it is important to get a quick start in January.

Prerequisites: This is a course which ties in many of the topics you have completed throughout your program. It is anticipated that you will be graduating in June. In addition, since there are a number of oral presentations and reports which will be handed in to show your progress, you must also be taking Technical Communication 2 concurrently.

Since you are in a Manufacturing program, the project will be a manufacturing project. As such, it is assumed that the design of the components to be manufactured is already complete. Attempting to design as well as build in a single term is too large a project.

The project should incorporate a number of components which will fit together in an assembly. Your project should include:

- An assembly drawing in CAD – preferably Inventor or Solidworks
- Complete drawings of each component
- Designs and drawings of any fixtures required
- A Process Plan for the manufacture of each component
- CNC Programming if required
- Manufacturing of each component including machining, welding, casting etc.
- Quality Checks
- Debugging and rework

Treat the project from the point of view of you being the owner/operator of a small shop. A customer has brought you a design and it is your job to build it. Assume that you will be building a small number of these assemblies – 10 for example – so your thinking in terms of planning and fixture design should reflect this quantity. In actual fact you will only build 1 or 2.

You will be expected to estimate timelines for each aspect of the project. As the project progresses you will be reporting your progress compared to your initial estimates. A budget including an estimated labour cost will also be required.

You will work in groups of 2 or 3 students and must divide the work up equally.

Although the size of the project does not reflect the complexity, for logistical reasons such as storage, cost and the size of the machinery you will be working on, the project should not be bigger than a breadbox. Most of the cost of materials, tooling etc. will be borne by the department. If special equipment is required, arrangements will have to be made.

Project Ideas

Rotational Molds for improving an assistive device used in the rehabilitation of arthritis patients.

An Injection Mold for a redesigned part required by the Red Cross.

Stamping and blanking tooling for a punch press to manufacture medallions to be handed out at BCIT's Open House.

A model Stirling engine – plans supplied.

A compressed air engine – plans supplied.

Projects for future Formula SAE involvement

- reverse engineering and manufacture of a Honda 600cc motorcycle engine
- design and manufacture of a pedal set with a clutchless shifting mechanism

Automated welding workcell for gas stove manufacturing

A small machine tool – eg wood lathe or drill press

CNC machining of a complex aircraft component

Casting molds for a new MECH 1210 chassis design