



A POLYTECHNIC INSTITUTION

School of Manufacturing, Electronics & Industrial Processes

Program: Mechanical Engineering Technology

Option: Manufacturing

**MANU 3314
Tool Design****Start Date:** 5 Sep 2006**End Date:** 15 Dec 2006**Total Hours:** 54 **Total Weeks:** 15**Term/Level:** 3 **Course Credits:** 4.0**Hours/Week:** 4 **Lecture:** 2 **Lab:** 2**Shop:** **Seminar:** **Other:****Prerequisites**

Course No.	Course Name
MECH 1210	Manufacturing Processes
MECH 2201	Engineering Graphics 2
MECH 2240	Strength of Materials

MANU 3314 is a Prerequisite for:

Course No.	Course Name
MANU 3410	Metrology
MANU 4412	Production Planning

4. Course Description

Examines the design of special purpose tooling, process planning, design considerations of various types of jigs, fixtures, gauges, metal cutting dies, feed mechanisms, presses, scrap strip-layout and the use of standard tooling components. AutoCAD and Carr Lane tool design assistance software will be utilized.

4. Evaluation

Assinments / Labs	30 %	Comments: Student must pass both the lab and the theory parts of course in order to attain a passing grade. Failure of either the lab or theory portion will result in a mark of 'U' (Unsatisfactory).
Midterm Exam	30 %	
Final Exam	40 %	
TOTAL	100 %	

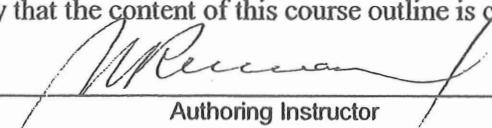
4. Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

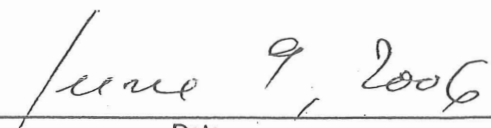
- Specify manufacturing process capable of producing fits, tolerances and surface finishes specified by the design.
- Use CSA standard for geometric tolerancing to dimension component drawing.
- Discuss and describe dies for metal blanking and piercing.
- Discuss and describe simple bending and forming dies.
- Discuss and describe simple progressive die sets.
- Utilize 3-2-1 principle for part location in a holding fixture.
- Select appropriate part holding devices when designing fixtures (strap, cam, toggle clamps, etc.)
- Design work holding devices for turning equipment – collets, chucks and turning fixtures.
- Utilize a dividing head for rotary indexing.

☐ Verification

I verify that the content of this course outline is current.

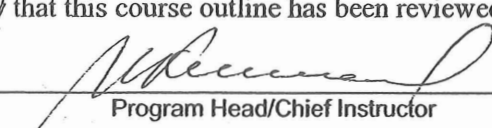


Authoring Instructor

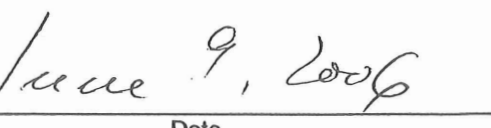


Date

I verify that this course outline has been reviewed.

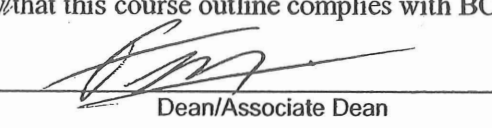


Program Head/Chief Instructor



Date

I verify that this course outline complies with BCIT policy.



Dean/Associate Dean



Date

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

☐ Instructor(s)

E. Kulhanek

Office Location: SW9 – 201J
Office Hrs.: by appointment

Office Phone: 604-432-8530
E-mail Address: ekulhane@bcit.ca

☐ Learning Resources

Required:

- E. G. Hoffman: Jig and Fixture Design
- Jensen & Hines: Interpreting Engineering Drawings

Recommended:

- David Reid: Fundamentals of Tool Design

☐ Information for Students

Note: Please refer to BCIT policy number 5002, Student Regulations Policy, for additional information. Policies are available at <http://www.bcit.ca/about/administration/policies.shtml>.

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 assignment, quiz, test, exam or project for all parties involved and/or expulsion from the course.

Assignments: Assignments, lab reports or projects must be done on an individual basis unless otherwise specified by the instructor. Late assignments, lab reports or projects will be devalued 10% per day late to a maximum of 3 days late.

Makeup Tests, Exams or Quizzes: There will be **no** makeup tests, exams or quizzes. If you miss a test, exam or quiz, you will receive zero marks. Exceptions may be made for **documented** medical reasons or extenuating circumstances. In such a case, it is the responsibility of the student to inform the instructor **immediately**.

Attendance: The attendance policy as outlined in BCIT Policy 5002 will be enforced. Attendance will be taken at the beginning of each session. Students not present at that time will be recorded as absent.

Illness: If you miss an evaluation such as an assignment, quiz, exam, or project, or you miss 3 or more consecutive days of class, you must provide the department with a BCIT Student Medical Certificate (available at <http://www.bcit.ca/admission/downloads.shtml>). You may be asked to complete the work that you missed or the course evaluation may be adjusted to reflect the missed component(s).

Attempts: Students must successfully complete a course within a maximum of three attempts. Students with two attempts in a single course must get written permission from the Associate Dean to attempt the course for the third time. Students who have not successfully completed a course within three attempts will not be eligible to graduate from the program.

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.

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.

☐ Assignment Details

Schedule

Week of/ Number	Outcome/Material Covered	Reference/ Reading
1	Introduction to Tool Design: - Describe role of tool designer - List objectives of tool design - Discuss tool design requirements	
2 – 4	Tool Materials: - Typical materials used for tooling - Physical and mechanical properties of various tool materials - Typical uses of ferrous materials in tool design - Typical uses of non-ferrous materials in tool design	
5 - 6	Geometric Dimensioning and Tolerancing: - Interpret standards for GD&T - Assign GD&T symbols	
7	Standard Tooling Components: - Uses of drill jig bushings - Various screws and nuts used in tooling - Pins, washers and springs used in tooling	
8 - 9	Work holding Principles and Devices: 3-2-1 principle of part location - Locating devices - Clamping devices - Selection of appropriate work holding device – strap, screw, cam and toggle clamps - Work holding devices for turning – collets, chucks and turning fixtures - Ejectors	
10 - 11	Jig Design: - Analyze and plan typical jig application - Layout and design drilling jig - Uses of open box type jigs	

Week of/ Number	Outcome/Material Covered	Reference/ Reading
12 - 14	Fixture Design: • Analysis and planning of typical fixture application • Layout and design of a milling fixture • Layout and design of a lathe and grinding fixture • Layout and design of an inspection fixture	
15	Final Exam	