A POLYTECHNIC INSTITUTION

Course Outline

School of Manufacturing, Electronics & Industrial Processes
Program: Mechanical Engineering Technology
Option: Manufacturing

**MANU 3316**
**Advanced Materials**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **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 |
|---|---|
| CHSC 2205 | Engineering Materials 2 |
| MECH 1210 | Manufacturing Processes |
| MECH 2240 | Strength of Materials |

**MANU 3316 is a Prerequisite for:**

| Course No. | Course Name |
|---|---|

## ☐ Course Description

Investigates application of materials for 'extreme services' such as high temperature, corrosion or cryogenic applications as well as non-traditional materials and processes currently found in modern manufacturing. These include plastics, composites and their forming processes as well as powder metallurgy and ceramics.

## ☐ Evaluation

| | |
|---|---|
| Assignments / Quizzes | 5 |
| Labs | 25 |
| Midterm Exams | 30 |
| Final Exam | 40 |
| TOTAL | 100% |

Comments: Student must pass both the lab and the theory part of the course in order to attain a passing grade. Failure of either the lab or thery portion will result in a mark of 'U' (Unsatisfactory).

## ☐ Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

- Understand the problems associated with low temperature, high temperature and corrosive environment services, and apply a systematic selection process to material specification for such applications.
- Understand the priciples of corrosion and corrosion protection.
- Understand the principles and methods used in powder metallurgy and ceramics processing.
- Perform basic fabrication processes related to FRP composites.

☐ **Verification**

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

Authoring Instructor — Date: June 9 / 2006

I verify that this course outline has been reviewed.

Program Head/Chief Instructor — Date: June 9 / 2006

I verify that this course outline complies with BCIT policy.

Dean/Associate Dean — Date: 2006/06/14

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 Phone: | 604-432-8530 |
| | Office Hrs.: | by appointment | E-mail Address: | ekulhane@bcit.ca |
| G. Henderson | Office Location: | SW9 - 106 | Office Phone: | 604-451-6725 |
| | Office Hrs.: | by appointment | E-mail Address: | ghenders@bcit.ca |


## ☐ Learning Resources

*Required*:

- safety glasses or shop face shield
- suitable close fitting clothing capable of protecting arms and legs - MUST BE WORN AT ALL TIMES in the lab
- CSA approved (Green Triangle) safety footwear - puncture proof sole, steel toe and ankle support

*Recommended*:

- Budinsky: Engineering Materials
- ASM: Metals Handbook

## ☐ 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 | Course overview, objectives and schedule<br>Engineering materials classification<br>Systematic material selection | |
| 2 – 4 | Composites:<br>• fiber reinforced<br>• particle reinforced<br>• laminates | |
| 5 - 6 | Polymeric materials | |
| 7 | Ceramics | |
| 8 | Powder metallurgy<br>Midterm | |
| 9 – 10 | Stainless steel classification & properties | |
| 11 | Extreme service – low/hi temperature | |
| 12 – 13 | Corrosion | |
| 14 | Review | |
| 15 | Final Exam | |