

Course Outline

A POLYTECHNIC INSTITUTION

School of Manufacturing, Electronics and Industrial Processes Program: Mechanical Engineering Technology Option: Design and Systems

MECH3320 Thermal Engineering 1

Start Date:	September 2006				End Date:	December 2006				
Total Hours: Hours/Week:	60 4	Total Weeks: Lecture:	15 2	Lab:	2	Term/Level: Shop:	3	Course Credits: Seminar:	4 Other:	
Prerequisites						MECH3320 is a Prerequisite for:				
Course No.	Course Name				Course No.	Course Name				
MECH 1120	E	nergy systems				MECH 4421	Th	ermal Engineering 2	2	

Course Description

This course is concerned with the topics of energy, heat and work. A practical and rigorous presentation of the first and second laws of thermodynamics will be presented. The concept of a thermodynamic cycle will be introduced. Several working fluids, including steam will be studied. These concepts will be used to analyze various energy systems including power generation and refrigeration cycles. An introduction to heat transfer is also presented with emphasis on heat conduction in solids and analysis of fins.

Evaluation

Labs/Assignments	15%	Comments:
Midterm exam	35%	Exams are open text book. One 8 1/2" by 11" formula
Final exam	50%	sheet is allowed. Extra notes are not allowed.
TOTAL	100%	

Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

- Perform energy balances for closed and open systems
- Analyze ideal gas systems
- Use the second law of thermodynamics and entropy
- Analyze steam and gas power generation cycles
- Analyze vapor refrigeration cycles
- Perform basic conduction heat transfer analysis
- Analyze fins for heat transfer enhancement
- Perform transient calculations for lumped systems

Verification

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

dring Instructor

I verify that this course outline has been reviewed.

A. Date

Wong Program Head/Chief Instructor

I verify that this course outline complies with BCIT policy.

Dean/Associate Dean

2006/08

06

Date

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

Instructor(s)

Koorosh Nikfetrat

Office Location: SW9-202 Office Hrs.: As posted Office Phone: (604) 451-6829 E-mail Address: koorosh_nikfetrat@bcit.ca

Learning Resources

Required:

Text book: Fundamentals of Thermal-Fluid Sciences 2nd edition, Cengel and Turner, McGraw Hill

Recommended:

Text book: Fundamentals of Engineering Thermodynamics, Moran and Shapiro, Wiley

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.

Schedule

This schedule is tentative and subject to change

Week of/ Number	Outcome/Material Covered				
1	Forms of energy, 1 st law				
2	Specific heats, Ideal gases, Working fluids and processes				
3	Steam tables, Open systems				
4	Open systems (cont.), 2 nd law, entropy				
5	Efficiency, Carnot cycles, Rankine cycle with superheat				
6	Review for midterm exam				
7	Midterm exam, Rankine cycle with reheat				
8	Diesel cycle, Brayton cycle				
9	Brayton cycle with regeneration, Refrigeration cycles				
10	Heat pumps, Heat transfer, Fourier's law of conduction, Conduction in slabs				
11	Conduction in cylinders, Multilayer conduction				
12	Fins, Conduction shape factors				
13	Lump analysis for transient conduction				
14	Review for final exam				
15	Final exam				