

HEAT TRANSFER

Department of Chemical Engineering
CHEM ENG 2A04

COURSE OUTLINE - Winter Term 2012

INSTRUCTOR:	Dr. Todd Hoare	JHE A409	Ext. 24701	hoaretr@mcmaster.ca
TEACHING ASSISTANTS:	Mathew Patenaude	JHE-256		patenamj@mcmaster.ca
	Vida Rahmani	JHE-133		rahmanv@mcmaster.ca
	Chad Smithson	JHE-A105B		smithc62@mcmaster.ca
	He Zhu	JHE-A105B		zhuh6@mcmaster.ca
SCHEDULE:	Lectures: 10:30-11:20PM (Monday, Wednesday, Thursday) BSB/147			
	Tutorials: T1 – 12:30-2:20PM Friday ETB/238			
	T2 – 2:30-4:20PM Monday ETB/238			
	T3 – 8:30-10:20AM Friday T13/125			

COURSE OBJECTIVES: This course will cover the principles of conservation of energy with the goal of mathematically modeling heat transfer problems. Problems will involve 1-D and 2-D solutions, calculated either analytically or using simple numerical methods on a computer. We will learn of the similarity between heat transfer, mass transfer and fluid mechanics and how the solution in one field can often be used to obtain solutions in the others. As one of the first courses in transfer phenomenon in chemical engineering, the main objective will be to develop a strategy for identifying the type of heat transfer problem that needs to be solved.

RESOURCES: Required text – *Introduction to Heat Transfer*, 6th edition, F. P. Incropera, D. P. Dewitt, T. L. Bergman and A. S. Lavine, Wiley and Sons, 2011

CALCULATORS: Any calculator may be used for midterm tests and the final exam.

WEBSITE: This course has an Avenue to Learn site which will be used as the primary location for posting lecture notes (notes only – solutions to in-class example problems will *not* be posted), tutorial problems (questions only – answers to tutorial problems will also *not* be posted), assignments, and solutions to both assignments and midterm tests. Marks will also be disseminated through the Avenue to Learn site. A discussion board is also available to post questions about the course and will be monitored regularly by the TAs and the instructor. Questions regarding course material should be posted on the discussion board, *not* e-mailed individually to the professor, so the entire class can benefit from the answers given. Questions regarding individual issues in the course may be directed by e-mail either through Avenue to Learn or directly to the instructor or the TAs. TA office hours will also be available and announced in class (and through Avenue) when determined.

GRADING:	Assignments (6 x 2% each)	12%
	Heat Exchanger Design Problem	5%
	Midterm Tests (best 2 of 3 test marks x 16.5% each)	33%
	Final Examination	50%

The final grade percentage will be converted to letter grades using the Registrar's recommended procedure. Adjustments up or down to the final grades may be done at the instructor's discretion.

COURSE SCHEDULE: The following is a list of important dates for the course. Further details about the course schedule can be downloaded in calendar form on Avenue to Learn.

January 11 – Assignment 1 posted on Avenue

January 18 – Assignment 1 due (in class); Assignment 2 posted on Avenue

January 25 – Assignment 2 due (in class); Practice Problems 1 posted (solutions on Avenue)

Week of January 31 – **TEST 1**, evening, time and location TBA

February 1 – Assignment 3 posted on Avenue

February 8 – Assignment 3 due (in class); Assignment 4 posted on Avenue

February 15 – Assignment 4 due (in class); Practice Problems 2 posted (solutions on Avenue)

February 20-24 – Reading Week (no classes or tutorials)

Week of February 27 – **TEST 2**, evening, time and location TBA

February 29 – Assignment 5 posted on Avenue

March 7 – Assignment 5 due (in class); Assignment 6 posted on Avenue

March 14 – Assignment 6 due (in class); Practice Problems 3 posted (solutions on Avenue)

Week of March 19 – **TEST 3**, evening, time and location TBA

March 21 - HX Design Problem posted on Avenue

April 4 – Heat Exchanger Design Problem due (in class)

NOTES:

Tests/Final Exam – Students will only be allowed to bring in their textbook and a single 8 ½" x 11" page of notes/equations into the midterm tests and the final examination. The page of notes must be **hand-written** (typed or photocopied sheets will be confiscated) and the writing may appear on both sides of the paper. **No other references will be allowed.** Tests or assignments not written in pen will not be considered for re-marking. Any evidence of copying or use of unauthorized aids (including cell phones, PDA, blackberry, etc.) will be treated as a case of academic dishonesty. *Special note:* All wireless devices (cell phone, etc.) are to be turned off for tests and the final exam – the instructor may impose a 10% penalty on anyone disrupting the examination. The instructor reserves the right to adjust marks on tests or exams at his discretion.

Missed Tests – Absence without a valid excuse will result in a grade of zero for a test or exam. If you have a legitimate medical/personal reason for missing a test or exam, you *must* complete the McMaster Student Absence Form and forward it to the instructor to receive consideration for waived tests; otherwise, a mark of zero will be applied. NO make-up tests will be arranged. In the event of one excused missed test, the full percentage allotted to tests will be calculated based on the average of the other two tests written. In the event of two excused missed tests, the course mark will be calculated as 16.5% for the one written test and 66.5% for the final examination.

Assignments – Assignments will be due by the end of the class on the day they are due. A 20% penalty is applied to any assignments handed in up to one day after the in-class due date. Assignments more than one full day late will NOT be accepted for marking. Excused lateness must be worked out with the professor **before** the assignment is due; otherwise, you *must* complete the McMaster Student Absence Form and forward it to the instructor to receive consideration for waived late penalties. You are encouraged to work on the problems with your colleagues and to seek the assistance of the TAs or professor, but direct copying of the solutions from another student or any other source is **not acceptable** and **will** be dealt with through a formal process. NO make-up assignments will be arranged; in the event of an excused missed assignment, the full percentage allotted to assignments in the final grade will be assigned by taking the average of all other assignments submitted.

All assignments must be done on 8.5 x 11” paper. The work must be neat with intermediate calculations and assumptions shown (**Note:** often the final answer has little or no value to the mark for the question). Failing to hand in neat, legible assignments, the TA has the right to deduct 10% off the final mark of the assignment. Consistent units must be shown at each step of your calculations. Use diagrams as part of your solution whenever possible. The final answer with units should be boxed. Your **name and student number must be on the top of each page** – no title pages please. Assignments may be done in groups of up to 3 people, provided all names and student numbers are shown and a declaration is included on the last page (signed by all group members) that all group members contributed equally to the completion of the assignment. Assignments done in pencil will not be re-marked.

Snow Day Policy – In the event of a snow day, a test will be rescheduled up to one week after the snow day and assignments will due at the end of the next class.

Electronic Communication – Class announcements will be communicated orally in class and via the message board and e-mail on Avenue to Learn. You are responsible for monitoring Avenue for course updates; failure to do so will *not* be considered a valid reason for missed work.

Policy Reminders:

The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem, that cannot be resolved by discussion among the persons concerned, individuals are reminded that they should contact their Department Chair or the Sexual Harassment - Anti-Discrimination Officer, as soon as possible. Students are reminded that they should read and comply with the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registration and available in the Senate Office.

***Academic dishonesty** consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at http://www.mcmaster.ca/senate/academic/ac_integrity.htm*

The following illustrates only three forms of academic dishonesty:

- 1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.*
- 2. Improper collaboration in group work.*
- 3. Copying or using unauthorized aids in tests and examinations.*