ENVIRONMENTAL ENGINEERING SYSTEMS
ENGG*2560
WINTER 2007

Instructor:

Warren Stiver, Ph.D., P.Eng.
Professor & NSERC Chair in Environmental Design Engineering
Rm 1343; x54862;
wstiver@uoguelph.ca
Www.soe.uoguelph.ca/webfiles/wstiver
folio.soe.uoguelph.ca
WebCT too
Office Hours: Wed 11-12 & any other time that I am in my office

Meeting Times:

Lectures Tu/Th 8:30 - 9:50 (Mack 226)
Tutorial Section 0101 - Mon 1:30 - 3:20 (Thrn 1103)
Section 0102 - Mon 11:30 - 1:20 (Thrn 1103)

Teaching Assistant:

Joe McIntyre (no office hours - i.e. use the tutorials effectively)

Text:

REQUIRED ... Murphy R.M. (2007) *Introduction to Chemical Processes: Principles, Analysis, Synthesis* McGraw-Hill. ISBN 978-0-07-284960-8

Recommended ... Perry's Chemical Engineering Handbook (CD-ROM) as a package with Murphy.

Notes:

All lecture overheads will be posted in batches on WebCT (mostly before lectures but this is not guaranteed). Supplemental information will also be provided via WebCT.

Prerequisites:

CHEM*1050, MATH*2270

Calendar Description:

Analysis techniques for natural and engineered systems including chemical, physical and biological processes. Mass balance analysis for steady state and unsteady state situations. Analysis under both equilibrium and non-equilibrium conditions. Reactor types including batch, plug-flow, CSTR. Noise pollution, control and prevention.

Evaluations:

Reactor Project:	20%	(Reports due: Tues. March 13th, 8:30am)
Urban Mass Balance Project:	20%	(Reports due: Tues. March 27th, 8:30am)
Assignments:	15%	(top 5 submissions)
Final Exam:	45%	(April 9th, 8:30 - 10:30 am)

Final Exam:

The exam will cover all aspects of the course. This includes the environmental systems that are the subject of lectures, assignments, sample problems or term projects.

Reactor Project:

A reactor analysis project that combines a lab, a computer program and pollutant behaviour in the Great Lakes. Completed in teams of two.

Urban Mass Balance Project:

A mass balance look at an element for the community of Guelph. Completed in teams of three.

Assignments:

There will be weekly assignments. You are encouraged to complete all of the assignments. At the end of 7 (approx.) of the weekly tutorials, one question will be identified (at random) for individual submission by 8:30 am on Tuesday. Submissions are expected to be of professional quality. That is a quality that is suitable for inclusion in the appendix of a professional engineering report.

Your assignment grade will only count if you pass the final exam. Should you fail the final exam, your final exam will be worth 60% of your final grade and your assignments will be worth 0%.

Policies:

- **Literacy and Numeracy Expectations:**
  All students are required to perform with a reasonable competency in both numeracy and literacy. Failing grades **WILL** be assigned on entire questions or projects (or substantial portions thereof) if the competency is inadequate at the 2nd year level. Artificially generated samples of incompetent work will be provided through the semester.
- **Academic Integrity:**
  Students must sign team submissions. Students who have not signed the cover page will NOT receive the grade assessed for the report. The University's academic misconduct policies will be applied, as described in the Calendar, when it becomes known that a student(s) has committed academic misconduct including claiming credit for work that they have not substantively contributed to.
- **Missed Laboratory:**
  Student missing scheduled laboratory times will not be allowed to reschedule without suitable grounds and documentation. The missing individual will automatically receive a 0.75 multiplier for the "Reactors Project".
- **Late Assignments or Projects**:
  Late assignments will be assigned a grade of zero (0). Late Projects will be assigned a grade of zero (0) in the absence of suitable grounds and documentation.

Topic Outline (nominal # of lectures): Suggested Reading*

Introduction (2)

Units and Dimensions (1) . . . . . Section 2.2

Mass Balance (2) . . . . . Chapters 1 and 3
- Stoichiometry
- Control Volumes
- Steady State & Unsteady State
- Total vs. by Element

Reactors (3) . . . . . Section 4.2
- Batch
- Continuous
- CSTR
- PFR
- Mixed

Reaction Kinetics (3) . . . . . Section 4.4
- Chemical
- Biological

Equilibrium (3) . . . . .
- Phase
- Reaction

Physical-Chemical Separation (3) . . . . . Chapter 5

Energy Balances (2) . . . . . Chapter 6

Noise (5) . . . . . Supplemental Notes
- Principles
- Modelling
- Control

Closure (1)

* it would be greatly to your advantage to read these prior to the corresponding lecture coverage

Comments:

All students are encouraged to submit signed written comments (positive or negative) to the Director of the School of Engineering on any aspect of this course.