AIR POLLUTION CONTROL
ENGG*4330
FALL 2012

Instructor:

David Lubitz
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Office Hours: Whenever I am in my office. Scheduled office hour TBD.

Meeting Times:

Lectures		T/Th	MacKinnon 224	10:00 - 11:20
Tutorial	01:	F	Thornbrough 1006	3:30 – 5:20
	02:	W	Thornbrough 1002	3:30 – 5:20
	03:	Th	Thornbrough 1002	3:30 – 5:20

Note: Some weeks tutorials may also use THRN 2336 (Computer Lab); THRN 1012 (Energy Transformation Lab) and THRN 1435 (new Design Studio)

Teaching Assistants:

Rohan Hakimi rhakimi@uoguelph.ca
Joe McIntyre (half time) jmcint03@uoguelph.ca

Text:

Recommended: C.D. Cooper and F.C. Alley, **2011**, *Air Pollution Control: A Design Approach*, 4th Ed., Waveland Press, Inc. Prospect Heights, IL.
(I would recommend purchasing if you like textbooks and tend to keep your textbooks following the completion of the course. This book is a good reference book for elements of Air Quality, Mass Transfer Operations and Air Pollution Control.)

Notes:

Copies of lecture presentation materials, plus supplemental material, will be posted on Courselink. (Note: posting of all materials shown or discussed in class is not guaranteed.)

Prerequisites:

ENGG*3260 Thermodynamics
ENGG*3180 Air Quality

Course Objectives:

Following completion of this course the students will understand techniques used to minimize the emission of air pollutants. These techniques include end-of-pipe solutions (e.g. electrostatic precipitators) and in process solutions (e.g. combustion chamber modifications). The understanding will include the underlying principles and the basics of design for each unit.

Learning Outcomes:

Learning Outcomes are becoming the norm in higher education as a means to improve accountability, to support continuous improvement in teaching and learning and to ease international mobility. The Washington Accord is the engineering agreement in this direction with 14 signatory countries including Canada.[1] As a result, the Canadian Engineering Accreditation Board (CEAB) adopted a graduate attribute approach to engineering program reviews.

Canadian Engineering Accreditation Board – Graduate Attributes

Graduate Attribute	Taught	Assessed	Graduate Attribute	Taught	Assessed
1. Knowledge Base	Y	Y	7. Communication	N	Y
2. Problem Analysis	Y	Y	8. Professionalism	N	N
3. Investigation	Y	Y	9. Environment & Society	N	Y
4. Design	Y	Y	10. Ethics and Equity	N	N
5. Engineering Tools	Y	Y	11. Project Mgmt	N	N
6. Individual & Team Work	N	Y	12. Life-long learning	N	N

The Province of Ontario has introduced UUDLEs (University Undergraduate Degree Level Expectations) for all Ontario programs. There is considerable overlap between the CEAB Graduate Attributes and the Ontario UUDLEs. However, there are important elements in Ontario's UUDLEs that are not covered by CEAB's Graduate Attributes. UUDLEs require CRITICAL THINKING, an understanding of all major engineering fields, an understanding of the methods of all non-engineering disciplines and to hold an awareness of the limits of knowledge.[2]

UUDLEs not covered in CEAB Graduate Attributes

UUDLE	Taught	Assessed
1. Critical Thinking	Y	Y
2. Other Engineering Fields	Chem / Mech	Y
3. non-Engineering Fields	N	N
4. Awareness of Limits of Knowledge	Y	Y

[1] www.washingtonaccord.org/Washington-Accord/signatories.cfm

[2] Stiver W., 2011, CEAB's Graduate Attributes and Ontario's UUDLEs, *Proceedings of the Canadian Engineering Education Association Conference*, St. John's, NFLD, June.

Evaluation:

Item	Grade Weight	Due Dates
Emissions & Energy Project	40%	
Phase I (Balances)		Tuesday October 2, 10:00 am (start of class)
Phase II (Energy& Emissions)		Tuesday October 23, 10:00 am (start of class)
Particulate Design Project	40%	
Phase I (Presentation +)		Tues. Nov. 13 / Thurs. Nov. 15 (part in class)
Phase II (Full report)		Fri Dec 14th, 12:00 noon (during exams) *
Tests	20%	
Test #1		Thursday Oct. 25, in lecture
Test #2		Thursday Nov. 22, in lecture

* Note: The instructor will not be available for support on Dec. 13th or 14th.

Individual and Team Work Expectations:
The two tests and Phase I of the Particulate Design Project are individual work. The Emissions & Energy Project and Phase II of the Particulate Design Project are to be completed in teams. Teams must consist of individuals from the same lab section. The Emissions & Energy Project will be conducted in teams of 3 (your choice of team members). Depending on student numbers, there may be some teams of 4, and students may need to be assigned to a team. The Particulate Design Project team size will be your choice (1 to whatever you wish) but there must be no overlap with your Emissions & Energy team. A team of one (1) could result from an individual that would just like it that way *or* from an individual that can't find willing teammates.

There will not be a formal peer evaluation. However, if the instructor becomes aware or suspicious that one or more members have not been substantive contributors to the work then an oral evaluation interview will be arranged. The result of the interview could lead to a grade multiplier of less than 1.0 or the lack of contribution may lead to filing of the case for academic misconduct assessment by the Dean's office. Keeping a logbook may be a prudent step.

Laboratory Project:
You will conduct two experiments using an engine/pump system. Each team will be allocated time to do the first experiment during the lab sections on Sept. 19 to Sept. 21. The second experiment will be scheduled outside of regular class times.

Design Project:
This project will involve design of a particulate pollutant control system. Teams will develop an innovative design idea and simulate it using CFD.

Tests:
Tests will be held during the lecture time period. Tests will be closed notes and books. Data and equation sheets will be made available to you with the test (posted for your information approximately 1 week prior to the test). You will be permitted to bring in your own single aid sheet (8½" x 11").

Assignments:
Assignments will be provided. The value in completing the assignment yourself will be for your learning. You are responsible for the material that is reflected by these assignments. Tutorials will be used for providing assistance in the completion of these assignments. Questions from old exams and tests will make up some of the assignments.

Policies:

- Missed labs, presentations and/or tests will require documented medical or compassionate evidence.
- **Late penalties**:
  - Reports may be submitted before the deadline to the instructor in person, or by having the report placed in the instructor's department mailbox.
  - Reports submitted late, but within 96 hours will receive a 30% penalty (i.e., the report will be marked, and then the final mark will be multiplied by 0.7); after 96 hours reports will not be accepted and a grade of zero (0) will be assigned.
  - Presentations not ready when scheduled will receive a grade of zero (0).
  - These penalties will not apply in cases of accepted compassionate or medical grounds – if these grounds exist see the instructor as soon as possible.
- A failing grade will be assessed when a solution is fundamentally flawed.
- **Literacy and Numeracy Expectations:** It is required that students will demonstrate reasonable competency in both numeracy and literacy. Failing grades **WILL** be assigned on entire questions or projects (or substantial portions thereof) for writing or calculations that are below the 4th year level.
- **Academic Integrity:** Team projects must include a cover page of the required format. 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.

Topic Outline (nominal # of hours):	Suggested Reading
Introduction & Air Challenges (1)	
Emissions & Energy (14)	Supplemental Notes & Chapters 11, 16, 18 in Text
Particulate matter control (12)	Linked USEPA docs & Chapters 3 to 7
Fugitive Emissions (4)	
Closure (1)	

Comments:

The instructor reserves the right to make changes to the course if needed, in accordance with University of Guelph academic regulations. Any course changes from those listed in this course outline will be announced in class and posted on the course Courselink page.

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.

Required Format for Lab & Design Report Cover Page

Design / Lab
Report

Date

a report completed in partial fulfilment of
Air Pollution Control
ENGG*4330

Team # or letter (as assigned)

Team Members

John Doe___(signature)
Jane Doe _____
etc.
(NOTE: Do NOT include student numbers)

By signing this cover page, we take responsibility and credit for the content of this report. Each individual signature signifies that the individual has been a substantive contributor to this report and the work that it represents.