CE 2C04 - STRUCTURAL MECHANICS
COURSE OUTLINE - WINTER TERM 2018

It the responsibility of each student to read this course outline completely and to ensure that they understand its entire contents. There is an online quiz on Avenue to make sure that you have read the syllabus, this quiz counts towards your participation grade and must be done by 5pm January 12th.

INSTRUCTOR
Dr. Tracy Becker (JHE-224; tbecker@mcmaster.ca)
Office hours: Tuesdays 1-2 pm and Fridays 9:30-10:30 am

TEACHING ASSISTANTS
Bryanna Noade (JHE329A; noadeb@mcmaster.ca)
Office hours: Mondays 10:30-11:20, Thursdays 1:30-2:20 – no lab questions
Yu Bao (JHE329A; baoy7@mcmaster.ca)
Office hours: tba – only lab questions
Moahmmadreza Najafi (JHE329A; najafijm@mcmaster.ca)
Office hours: tba – only lab questions

SCHEDULE
Attendance at all course activities (classes, labs, tutorial sessions, exams) is mandatory.
Phones may not be used during classes, tutorials, labs, or exams. Turn them off beforehand and put them away.

Class: Tuesday, Thursday, Friday 11:30 - 12:20 KTH B135;
The classes will be used to present theoretical background, approaches to analysis, and applications to a variety of problems.
Tutorial: Tuesday 8:30-10:20, Wednesday 4:30-6:20 BSB 137
The tutorials will be used for additional examples and question and answer sessions. Grades for tutorial attendance and participation will assigned by the TA.
Lab: L1: Thursdays 2:30-5:20, L2: Fridays 8:30-11:20 JHE-121
You will only be required to attend one one-hour laboratory. The lab times may also be used for additional course activities such as lectures.

TEXTBOOK
The textbook for the course is “Mechanics of Materials”, by Beer, Johnson and DeWolf. Practice problems will be assigned from the text.

ONLINE
Problems, solutions, lab information and notices will be posted on avenue. It is your responsibility to check the website for new postings.
We will also be using pebblepad for peer reviewing. We will go over how to use pabblepad in class. If you don’t know how to use pebblepad, you will not be able to complete your pre-exam assignments (12% of your grade).

EMAIL
All email communication with the instructor and TAs must be sent from your @mcmaster.ca address and sent to the @mcmaster.ca addresses listed above. DO NOT send email through the Avenue email system as this system is not monitored. Questions on course material (i.e. how do I solve this problem?) are best explained in person and will not be answered via email; please visit office hours.

COURSE CONTENT
This is a second course in structural mechanics within McMaster’s civil engineering program (the first course is 2P04). The focus of this course is on further developing your understanding of basic skills in structural mechanics (also referred to as mechanics of materials, or strength of materials). These skills are fundamental to subsequent courses in structural engineering. This course mainly deals with concepts of stress, strain and energy applied to
civil engineering structures. In this course we will cover (time permitting) aspects related to the following topics:

- Shear force and bending moment diagrams
- Bending of beams for linear and nonlinear material behaviour
- Shearing of beams for linear behaviour
- Torsion of beams for linear and nonlinear behaviour
- Combined loading
- Transformation of stress and material failure criteria
- Deflections of structures and energy methods
- Column buckling and elastic stability

**LEARNING OUTCOMES**

1. Ability to assess integral properties of problems including: boundary conditions, loading conditions, determinant vs. indeterminate, and linear vs. non-linear.
   - CEAB attribute 1.3 “Competence in Engineering Fundamentals”
   - CEAB attribute 3.2 “Capable of selecting appropriate model and methods and identify assumptions and constraints.”

2. Use the knowledge from (1) to select appropriate methods to solve desired quantities.
   - CEAB attribute 3.1 “Able to recognize and discuss applicable theory knowledge base”

3. Verify solutions from (2) using additional knowledge and/or engineering judgement.
   - CEAB attribute 2.3 “Ability to obtain substantiated conclusions as a result of a problem solution including recognizing the limitations of the solutions.”

4. Evaluate laboratory data against theoretical solutions and use engineering judgement to discuss discrepancies.
   - CEAB attribute 3.3 “Can estimate outcomes, uncertainties and determine appropriate data to collect.”

**EVALUATION AND GRADING**

Your final grade will be based on:

- Three midterms (Two best scores taken - 20% each)
- Three pre-exam assignments (4% each – 12% total)
- Lab (16% total) – to pass the course you must participate in the lab and submit a lab report
- Final exam (25%)
- Tutorial participation (4%)
- Class participation (3%)

Additional important information and special conditions on calculating your final grade are given in the following sections. The final percentage grade will be converted to a letter grade using the Registrar's scale.

**MIDTERM EXAMS**

There will be three midterm exams, only your best two scores will count towards your final grade. The midterm exams are scheduled for: Jan 29, Feb 26, and March 19 from 7:00-8:30 pm. The midterms will be closed book; I will provide necessary equations. During exams you may use only the McMaster Standard Calculator.

Tests not claimed when midterms are returned may be claimed from the instructor during regular office hours only. If you wish to appeal the grading of a test this must be done within one week of the date on which the tests were officially returned.

If you receive over 90% on all three of the midterms, you are exempt from having to take the final exam.

**Missed test(s):** If you miss one midterm, your final score will be composed of the remaining two midterms. If you miss a second midterm, you can arrange with me to take a make-up midterm. However, you will only be allowed to take a make-up midterm if you have filed MSAFs (mcmaster.ca/msaf/) within 48 hours of both missed exams and provided the Associate Dean’s office with the appropriate paperwork. Otherwise, a mark of zero will be given for
one of the midterms.

**PRE-EXAM ASSIGNMENTS**

Before each midterm exam (3 times) you must develop your own exam question based on the applicable course material, complete with a clear comprehensive solution. Aim for something that would take 20-30 minutes to complete. You must upload this on pebblepad by the Wednesday night (9pm) before the exam. You will then grade questions uploaded by your classmates by the Sunday night (9pm) before the exam. Late submissions and evaluations will not be accepted, but you can still receive part marks by evaluating your colleague’s assignments. You will grade the questions based on:

- Originality/creativity (Have they copied the most basic problem from the textbook and changed the numbers? Or have they thought creatively about possible applications?)
- Use of the course material (Does the question well represent material covered in the course?)
- Correctness (Have they made - and stated - appropriate assumptions? Used the right equations? Put the correct quantities into the equations? Drawn appropriate conclusions?)

Your grade will come in part from the peer evaluation and in part from your evaluation of your classmates. I will post the top problems online and the most insightful problems may appear on the final exam.

**LAB**

You are required to participate only once in a one-hour laboratory session. The lab will be done in a pre-assigned group, but the data analysis and report writing will be done on an individual basis.

- Labs will be run Feb 8th/9th, March 1st/2nd, and March 15th/16th. If you have a legitimate conflict with any other these dates (e.g. traveling for a club competition) you must let me know before January 19th. If you are enrolled in the Thursday lab but would be willing to complete your lab on Friday, please let me know by January 19th as well.
- Details of the lab will be posted on Avenue in late January. You should read all the lab information and complete the lab quiz (a quick easy quiz on lab safety and preparedness) on Avenue 24 hours before attending your assigned lab. You can take the quiz up to 5 times. If you have not passed the lab quiz with 100%, you will not be allowed to participate and you will have to reschedule and forfeit 40% of your lab grade.

Note: If you are repeating this class and you received a minimum lab score of 24/30 in the previous year, you can keep your lab score from last year without redoing the lab. If you choose to do this, you must inform me before January 19th.

**Lab Report:** A hard copy lab report is due one week after the lab session by 11:30 am (if your lab is on Thursday, the report is due the following Thursday). All late labs MUST be time stamped by the civil engineering office (JHE-301) before being put in the drop box. The penalty for late submission is 20% of the full value of the report per day, 40% over the weekend.

**Missed Lab:** Attendance will be taken at the lab. If you are absent from your scheduled lab session you must file an MSAF within 48 hours of the scheduled lab session and make arrangements with me to make up the lab. Otherwise, there will be an automatic late penalty of 40% of the full value of the lab report. There will be no make-up lab sessions scheduled after March 17th (if you do not attend a replacement lab session by that date you will receive a grade of F for the entire course).

**PRACTICE PROBLEMS**

Weekly practice problems will be assigned and discussed in the tutorials; they will not be handed in or graded. Many additional problems can be found in the textbook and you are strongly encouraged to use these for practice. The purpose of the practice problems is to give you an opportunity to develop an understanding of the application of the course material. While discussion with other students of the background and approach to solution of problems is often beneficial, you need to ensure that you can actually solve the problems on your own without notes or textbook examples to guide you (i.e., the way it will be during the tests and exam).
ETHICS
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 sections 17 and 18 and Appendix 3, located at http://www.mcmaster.ca/univsec/policy/AcademicIntegrity.pdf

UNIVERSITY STATEMENT ON CHANGES TO THE COURSE
The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.