Civil Engineering 2P04
Statics & Mechanics of Materials - Fall Term, 2018-2019

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Lectures: Tuesday Wednesday & Friday (12:30-1:20) HH 302
Tutorial: Tue (3:30-5:20) ITB 139; Wed (9:30-11:20) BSB 138 & Thu (11:30-1:20) T13 105

Course Objectives and Learning Outcomes:
At the end of this course student should be able to; 1) identify the load effects and the boundary
effects on a simple structure, 2) analyze simple determinate and indeterminate structures, 3)
calculate the stresses and strains in members due to internal forces, 4) calculate axial, torsional
and flexural displacements in simple structures/members, and 5) obtain principal stresses and
orientation at a point.

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Content</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Review of Statics: EQUILIBRIUM OF A PARTICLE Vector representation of a force, Resultant of forces, Equilibrium of a particle. (2-Dimensional applications)</td>
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<tr>
<td>2</td>
<td>Review of Statics: EQUILIBRIUM OF A RIGID BODY Vector representation of moments, Resultant of forces and moments, Equivalent force system (distributed loads), External reactions, Concept of a free body diagram, Equilibrium of a rigid body (2-Dimensional applications).</td>
<td>3</td>
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<td>3</td>
<td>ANALYSIS OF STRUCTURES: Analysis of Trusses, Two Force Members, Zero Force Members, Analysis of Frames and Machines (2-Dimensional)</td>
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<td>4</td>
<td>INTERNAL FORCES: Member end forces, Member internal forces, Shear force and bending moment diagrams, Relations between load, shear force and bending moment. CONCEPT OF STRESS: Normal Stress, Shearing Stress, Bearing Stress in connections</td>
<td>5</td>
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<td>5</td>
<td>ANALYSIS OF MEMBERS SUBJECT TO AXIAL LOADING: Deformation of a member under axial load, Statically indeterminate problems, Problems involving temperature changes, Multi-axial loading and generalized Hooke's Law.</td>
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<tr>
<td>6</td>
<td>ANALYSIS OF MEMBERS SUBJECT TO TORSION: Shear stress and strain, Torsion of solid and hollow circular sections, Polar Moment of Area,</td>
<td>3</td>
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</table>
Torsional Stresses in Axi-Symmetric Members, Angle of Twist in Axi-symmetric Shafts.

2nd Term Test - November 02, 2018 (7:00-10:00pm) T13-123, T13-127

ANALYSIS OF MEMBERS SUBJECTED TO PURE BENDING:
Properties of sections – First Moment of Area, Centroid, Second moment of areas, Parallel axis-theorem, Deformation of a symmetric beam in pure bending, Bending (normal) stress distribution, Eccentric axial loading.

ANALYSIS OF MEMBERS SUBJECTED TO TRANSVERSE SHEAR:
Stresses due to transverse loads, Shear stresses in common beams, Longitudinal Shear on a beam element, Shear stress distribution in thin-walled structural sections, Critical shear stress.

TRANSFORMATION OF STRESS AND STRAIN: Stresses due to combined axial, flexural and torsional loadings. Introduction to transformation of stresses, Principal stresses, Mohr’s circle representation.

3rd Term Test – November 23, 2018 (7:00-10:00pm) T13-123, T13-127

Depending on the progress of the course either additional topics may be covered or some topics may not be covered.

Recommended Reference Material
The textbook above is recommended for the course. A number of reference texts related to Mechanics of Materials are available at Thode Library.

Avenue
http://avenue.mcmaster.ca/
Lecture notes; Additional notes and Assignments will be posted on Avenue. Students are expected to check and read all the material posted on avenue.

Assignments/Tutorials
During the course of this term, students are expected to work independently and in groups. Students are placed in a group of 3 or 4 to work together during tutorial time. For this model to work, every student is expected to come prepared to the tutorials by having completed the assignments on their own. This means that every student needs to submit his/her work electronically via avenue prior to coming to the tutorial. Please note that the TA will be checking the electronically submitted assignments for a) plagiarism and b) to ensure that everyone is completing the assignments. For the students who received a grade below 65% on the term test, a detail review of the electronically submitted assignments will be carried out by the TA and discussed with the student.

Important Note – If a student does not submit their assignment prior to the start of the tutorial, he/she will receive a grade of zero on that assignment. After the third time, the student will receive a failing grade for the assignment portion of the course.

Ten assignments will be given during the term to assist in understanding the course material. Students are expected to work together on the assignment during tutorial time as per assigned groups. One assignment (paper version) is handed in per group at the end of the tutorial and will be graded by the TA. Group number, the name and student no of every group member, and
name of the person submitting on behalf of the group are to be written on all submissions. Every student is expected to submit at least one assignment.

**Term Tests**
There will be three 2-hour term tests. The dates and testing rooms are confirmed. If the date and time of the term tests conflict with your regular academic schedule, you need to inform the instructor no later than September 10 by email.

**Grading Procedure**
Final grades will be converted to the twelve-point letter grade system using the standard conversion scale. Individual components will be weighted as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>12%</td>
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<tr>
<td>Term Tests</td>
<td>66%</td>
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<tr>
<td>(22% for each term test)</td>
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<tr>
<td>Final Exam</td>
<td>22%</td>
</tr>
<tr>
<td>Bonus</td>
<td>3%</td>
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<tr>
<td>(Class attendance &amp; group work)</td>
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In order to pass the course, students must complete and pass the assignments, term tests and exam portion of the course. If a student misses a term test, he/she needs to contact the Associate Dean of Engineering in order to obtain permission for relief (Refer to the McMaster Undergraduate Calendar for the relevant policy). If a relief is granted, there will be no makeup test and the missed term test will be re-allocated to the final examination.

Students that have written and received a grade is equal to or greater than 60% on all three term tests and whose cumulative average is equal to or greater than 75% have the option to be exempt from writing the final exam. If you meet the requirements and choose not to write the final exam, you need to inform the instructor by email no later than December 03, 2018. For those that receive an exemption, the individual components for the final grade will be weighted as follows:

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<th>Component</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>12%</td>
</tr>
<tr>
<td>Term Tests</td>
<td>88%</td>
</tr>
<tr>
<td>(29.3% for each term test)</td>
<td></td>
</tr>
<tr>
<td>Bonus</td>
<td>3%</td>
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<tr>
<td>(Class attendance &amp; group work)</td>
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Bonus marks will be granted to groups whose members endorse the peer teaching. This will be evaluated by examining the trend of the coefficient of variance of the group members’ grade received on the term tests.

The percentage marks will be converted to final letter grade using the standard conversion scale shown in the McMaster Undergraduate Calendar.

**Important Notes**
“The instructor and university reserve the right to modify elements of the course during the term. The university and instructor 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 the 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.”

1. All lectures and tutorials are mandatory.
2. CE 2P04 students are to attend Registrar’s office assigned tutorial section.
3. All emails exchange are to be via the course dedicated email CE2p04@mcmaster.ca using a McMaster University e-mail account. Emails from non-McMaster accounts will not receive a reply and we will not be checking for emails via avenue.
4. Students are expected to work in groups during tutorial. If there are any problems, communication/delivery or others, among group members, they are expected to first resolve it among themselves. If the problem is not resolved within one week, the group is expected to contact the TA for assistance.

**POLICY REMINDERS**

Students are reminded of the following Policies, which could be relevant to activity in this course:

**Calculators**
Any Standard Calculator may be used during assignment/tutorials, term tests, and final examination.

**Ethics and Dishonesty**
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](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.

**Adverse Discrimination**
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 involved, individuals are reminded that they should contact their Department Chair, the Sexual Harassment Office or the Human Rights Consultant, as soon as possible.

**Health and Safety**
The Faculty of Engineering is committed to McMaster's University Workplace and Environmental Health and Safety Policy which states: "Students are required by University policy to comply with all University health, safety and environmental programs".
It is your responsibility to understand McMaster University Workplace and Environmental Health and Safety programs and policies. For information on these programs and policies please refer to McMaster University Environmental and Health Support Services Occupational Safety Risk Management Manual at: [http://www.workingatmcmaster.ca/link.php?link=Job+Matters%3APolicy-Manual](http://www.workingatmcmaster.ca/link.php?link=Job+Matters%3APolicy-Manual)
It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment.

SEC – 03/09/2018