CIVE 3202 Mechanics of Solids II

Objectives and Learning Outcomes

Upon successful completion of this course, the student will:

• acquire knowledge on the fundamental principles, theory and application of advanced solid mechanics, for the topics outlined in the course syllabus, with respect to the analysis of common problems encountered in Civil Engineering,
• develop critical thinking skills, through the synthesis of engineering knowledge acquired from this course and others,
• apply skill in solving problems, interpreting results and understanding how these outcomes can be used to support engineering analysis and design, and
• acquire technical capabilities (e.g., software programming) and personal attributes (e.g. work effectively within a team environment).

Instructor and Teaching Assistants

Instructor: Shawn Kenny, Ph.D., P.Eng., Associate Professor
Room 4205 CB
T: 613 520 2600 x8338; E: shawn.kenny@carleton.ca
Office Hours: Tuesday & Thursday 1200-1400

1 Laboratory exercises have the same schedule as the PA sessions but held in MC 1084.
2 Any electronic correspondence will only be used to schedule meetings (e.g., to meet outside office hours), and to provide information to the instructor (e.g. documentation on reasons for deferred exam). General questions will not be answered.
Teaching Assistants: Laboratory Sessions:

Rob McDonald
Room: 6212 CB
E: RobMcdonald2@cmail.carleton.ca
Office Hours: Thursday 1300-1600

PA Sessions & Other Duties:

Rob McDonald
Topic: PA1 – Shear Flow & Center
Room: 6212 CB
E: RobMcdonald2@cmail.carleton.ca
Office Hours: Thursday 1300-1600

Daniel Van-Johnson
Topic: PA2 – Energy Methods
Room: 330 AP
E: DanielVanJohnson@cmail.carleton.ca
Office Hours: Wednesday 1300-1400

Omar ElSafdi
Topic: PA3 – Elastic Stability
Room: 3371 ME
E: OmarElSafdi@cmail.carleton.ca
Office Hours:

Elham Nakhostin
Topic: PA4 – Plastic Behaviour
Room: 6212 CB
E: ElhamNakhostin@cmail.carleton.ca
Office Hours: Thursday TBD

PASS Facilitator TBD
Course Syllabus, Lecture Format and PA Schedule

Introduction

• Course overview with learning outcomes, expectations and requirements

Transverse Shear

• Shear stress, flow and center

Energy Methods

• External work, strain energy & conservation of energy
• Impact loading
• Principle of virtual work
• Rayleigh-Ritz method

Elastic Stability

• Critical load, column buckling & eccentricity
• Energy methods
• Numerical methods

Plastic Behaviour

• True stress-strain behaviour
• Inelastic deformation
• Inelastic buckling (time permitting)

Failure Theories

• Failure theories and criterion
• Fatigue and fracture (time permitting)

The lectures will examine the major concepts as outlined in the course syllabus through modules addressing specific topics. The lectures will use slides, worked examples and discussion to illustrate the theory and application of solid mechanics. The lecture slides will be available for download from cuLearn and are intended to facilitate learning. The slides should not be used as a substitute for attending class. Students are encouraged to enhance their learning experience through development of supplementary notes, and to engage peers, TAs and lecturers through lines of inquiry and dialogue. You will have access to cuLearn resources up to and including the last day of class for the Winter term.

3 See supplementary reading material “2013 Cohen Note Taking.pdf”
The Lab & PA session schedule is:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Even Week Sections</th>
<th>Odd Week Sections</th>
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</thead>
<tbody>
<tr>
<td>No Lab or PA Session</td>
<td>Week of January 8th</td>
<td></td>
</tr>
<tr>
<td>Lab Exercise 1 &amp; 2</td>
<td>Week of January 15th</td>
<td>Week of January 22nd</td>
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<tr>
<td>PA1 – Shear Flow &amp; Center</td>
<td>Week of January 29th</td>
<td>Week of February 5th</td>
</tr>
<tr>
<td>PA2 – Energy Methods</td>
<td>Week of February 12th</td>
<td>Week of February 26th</td>
</tr>
<tr>
<td>PA3 – Elastic Stability</td>
<td>Week of March 5th</td>
<td>Week of March 12th</td>
</tr>
<tr>
<td>PA4 – Plastic Behaviour</td>
<td>Week of March 19th</td>
<td>Week of March 26th</td>
</tr>
<tr>
<td>No Lab or PA Session</td>
<td>Week of April 2nd</td>
<td></td>
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</tbody>
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**Method of Evaluation**

- **Quiz**: 15% (10 quizzes)
- **Lab Analysis**: 5% (2 analysis cases)
- **Term Exam**: 20% (4 term exams)
- **Final Exam**: 60% (1 Final exam - Room and date determined by Carleton Central)

**Course Resources**

- **Mechanics of Solids, 2nd Edition; C. Ross, J. Bird and A. Little; Routledge; ISBN 9781317445319**

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4 The course evaluation will follow the current version of the University Calendar with respect to Course Evaluation governed by the Academic Regulations – except as noted
5 The activity will be conducted online using cuLearn with no deferrals.
6 The final exam will be closed book with a formula sheet provided. Only non-programmable calculators are allowed. The final exam will not be returned to the student. The Academic Regulations will govern the final examination (http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/acadregsuniv2/#2.5).
Academic Regulations, Policies and Support Services

The following electronic resources provide information on academic regulations, policy and support services.

- Regulations
  - http://calendar.carleton.ca/undergrad/regulations/academicregulationsandrequirementsforthebachelorofengineeringdegree/
  - http://carleton.ca/cee/current-students/current-undergraduate-students/
- Integrity
  - http://carleton.ca/studentaffairs/academic-integrity/
- Student Rights and Responsibilities
- Academic Support Services
  - http://www.carleton.ca/academics/support/
- General
  - http://www.carleton.ca/studentaffairs/