EXPANDED COURSE DESCRIPTION
MECHANICAL ENGINEERING
Lassonde School of Engineering
Mechanical Engineering
LE / MECH 3502 3.0 SECTION A
SOLID MECHANICS AND MATERIALS LABORATORY
FALL 2018 / WINTER 2019

Last Modified Date: 08/20/2018

COURSE CALENDAR DESCRIPTION

Building on the foundational knowledge in the mechanics of materials, this course introduces students to a number of measurement and characterization methods used for macro- and micro-systems. A selected number of laboratory experiments and demonstrations may include: strain measurements (e.g. strain gauges and/or speckles interferometry method), deflection measurements, hardness, impact, non-destructive testing method for crack detection; material characterization methods including techniques such as SEM, AFM, nano-indentors, etc.; motion measurements, traditional and optical (using imaging methods, e.g. by a cell phone camera). Students will continue to develop their skills in data collection, analysis, and the presentation of findings. Prerequisites: SC/CHEM 1100 4.00; LE/MECH 2301 3.00; LE/MECH 2502 3.00.

INSTRUCTOR(S)

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<th>Name</th>
<th>Section / Format / Term</th>
<th>Contact Email</th>
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<tr>
<td>Czekanski, Aleksander</td>
<td>Sec. A / LECT / F</td>
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ADDITIONAL INFORMATION

LECTURES AND LABORATORIES

This is a course that introduces students to a number of measurement and characterization methods related to solid mechanics and materials. It also allows students to practice the related fundamental concepts learnt in previous courses. The gained knowledge and experiences in this course will be essential for any future project activities. The lectures aim to supplement the experiential learning in the laboratory. Topics include:
- Solid Mechanics Review
- Introduction to Material Science and Atomic Structure/Bonding
- Structure of Crystalline Solids
- Imperfections and Diffusion
- Mechanical Properties of Metals
- Dislocations and Strengthening Mechanisms
- Failure
- Alloys and Phase Diagrams
- Heat Treatment
- Polymers
- Composites and Ceramics

COURSE LEARNING OUTCOMES

Upon the completion of this course, students are expected to learn and retain the following concepts and skills:
1. Use appropriate mechanical testers to investigate mechanical properties of materials and relate the obtained data to the concepts of solid mechanics and materials.
2. Examine the processing-structure-property relationships of materials (e.g., heat treatment of carbon steel).
3. Describe different modes of material failure using the principles of fracture mechanics.
4. Apply appropriate microscopy techniques to characterize different micro-and nanostructures of materials.
5. Develop concise and professional reports that reflect critical analysis of experimental data.
6. Recognize laboratory safety guidelines and practices related to performing experiments in the field of solid mechanics and materials.

**EVALUATION SCHEME**
- Exam - 30%
- Assignments - 10%
- Mini-Reports - 28%
- Reports - 32%

**TEXTBOOK**
**Required:**

**Suggested:**

**ACADEMIC INTEGRITY LINKS**
- Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
- Academic Integrity - http://lassonde.yorku.ca/academic-integrity

**STUDENT LINKS**
- Student Rights and Responsibilities - http://oscr.students.uit.yorku.ca/student-conduct
- Religious Observance - https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs
- Counselling and Disability Services - http://cds.info.yorku.ca/
- York University’s Policies on Gender/LGBTQ*/Positive Space - http://rights.info.yorku.ca/lgbtq/

**LAND ACKNOWLEDGEMENT**
- We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.
- The Indigenous Framework for York University: A Guide to Action can be found here: http://indigenous.info.yorku.ca/
- Meaning of a land acknowledgement: http://healthydebate.ca/opinions/indigenous-land-acknowledgements

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Many courses utilize Moodle, York University’s course website system. If your course is using Moodle, click here to access it.

**Moodle @ York University**