Faculty of Engineering
McMaster University, Hamilton, Ontario, CANADA
Term I (September − December | 2024)

MECH ENG 2P04: STATICS & MECHANICS OF MATERIALS

COURSE OUTLINE

Instructor

Phil **KOSHY**
JHE 326E | ext. 27833 | koshy@mcmaster.ca
https://www.philkoshy.com

Schedule

- Lectures:
  - Mon, Thurs | 3:30 – 4:20 | JHE 264
  - Tue | 4:30 – 5:20 | JHE 264

- Tutorials:
  - Mon | 12:30 – 1:20 | ITB 137
  - First tutorial on Mon, Sep 9

Learning Outcomes

Upon successful completion of the course, the student will have demonstrated the ability to:

1. Identify load effects and boundary effects in simple structures
2. Analyze simple determinate and indeterminate structures
3. Calculate stresses and strains in members due to internal forces and moments
4. Calculate normal and shear deformations in structural members

Graduate Attributes

This course provides students with the opportunity to develop the following measures of graduate attributes:

Graduate Attributes	*Learning Objectives where it is measured*
Knowledge Base for Engineering (Indicators 3 & 4)	1,2,3,4

Recommended Course Material

- ***Course pack:*** **MECHANICAL ENGINEERING 2P04: BRIEF NOTES & EXAMPLE PROBLEMS**
  (Compiled by Prof. Sivakumaran | uploaded on the course website on Avenue to Learn)

- ***Textbook:*** Beer, Johnston, DeWolf, Mazurek, "**STATICS and MECHANICS of MATERIALS**,"
  Third Edition, McGraw-Hill, 2020
  The textbook listed above is recommended (but not mandatory) for the course.

Lecture Content

	Topic	Lectures
1	Review of statics: vector representation of a force, resultant of forces, equilibrium of a particle (2-dimensional and 3-dimensional applications)	4
2	Review of statics: vector representation of a moment, equivalent force system (distributed loads), external reactions, concept of a free body diagram, equilibrium of a rigid body (2-dimensional and 3-dimensional applications)	4
3	Analysis of structures (trusses, frames and machines)	3
4	Internal forces: stress resultant system, shear force and bending moment diagrams	4
5	Axial loading: deformation of a member under axial load, statically indeterminate problems, problems involving temperature changes, multi-axial loading and generalized Hooke's Law	6
6	Shear stress and strain, torsion of solid and hollow circular sections	4
7	Pure bending of beams: properties of sections – second moment of area, deformation of a symmetric beam in pure bending, bending (normal) stress distribution	6
8	Shear stresses in beams, shear stress distribution in thin-walled structural sections	4
9	Stresses due to combined axial, flexural and torsional loadings	2
	Total number of lectures:	37

The above is a tentative list of topics anticipated to be covered during the lecture periods shown; however, depending on the progress with the course, additional topics may be covered, or some topics may have to be left out.

Practice Problems

Practice problem sets will be distributed weekly. Please see the course website on A2L for problems and solutions. Students are strongly encouraged to solve the problems in the practice problem sets prior to the tutorial, during which time, some of the problems in the sets will be discussed. This course is problem-oriented, which means that concepts and applications are better learned by solving as many problems as possible. Though the course includes weekly practice problem sets, students are strongly encouraged to solve additional problems available in books related to topics discussed in this course.

Term Tests

There will be **two** term tests. Books and notes are not permitted during the term tests, as well as during the final examination.

Term Test I: Thursday, October 10 | 6:30 pm – 8:30 pm | T13 101 & 123
Term Test II: Friday, November 15 | 6:30 pm – 8:30 pm | T13 101 & 123

Grading

Term Tests: 50% (each term test is worth 25%)
Final Examination: 40%
Assignments (4): 10%

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

Procedure for Remarking Term Test Answer Books
If a student has an issue with the way in which a term test has been evaluated, he/she may lodge their objections within a week of returning the marked papers.

Please follow the steps below while submitting material for remarking:
Compare your solutions to that posted on the course website. Write your complaint in a separate piece of paper indicating: (i) Problem number(s) you have a complaint about, (ii) Detailed nature of the complaint, and (iii) The marks you think you should have received, in reference to the solution/marking scheme posted on the course website. Please submit this along with your answer book to the instructor. The student will receive a written response from the TA that marked the paper; if the student does not agree with the response, the student may submit the whole documentation to the instructor for arbitration.

Equity, Diversity and Inclusion:
Every registered student belongs in this course. Diversity of backgrounds and experiences is expected and welcome. You can expect your Instructor to be respectful of this diversity in all aspects of the course, and the same is expected of you.

The Department of Mechanical Engineering is committed to creating an environment in which students of all genders, cultures, ethnicities, races, sexual orientations, abilities, and socioeconomic backgrounds have equal access to education and are welcomed and treated fairly. If you have any concerns regarding inclusion in our Department, in particular if you or one of your peers is experiencing harassment or discrimination, you are encouraged to contact the Chair, Associate Undergraduate Chair, Academic Advisor or the Equity and Inclusion Office.

Physical and Mental Health:
For a list of McMaster University's resources, please refer to the Student Wellness Centre.

Academic Integrity
You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. It is your responsibility to understand what constitutes academic dishonesty.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour 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. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at https://secretariat.mcmaster.ca/university-policies-roceduresguidelines/

The following illustrates only three forms of academic dishonesty:
- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

Authenticity / Plagiarism Detection
Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so that it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

Courses With an On-Line Element
Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle,ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

Conduct Expectations
As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g., use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

Academic Accommodation of Students with Disabilities
Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

Requests for Relief for Missed Academic Term Work
McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

Academic Accommodation for Religious, Indigenous Or Spiritual Observances (RISO)
Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Copyright and Recording
Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical, and artistic work, including lectures by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

Extreme Circumstances
The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.