ENS 204 - Mechanics  
Fall 2023-2024  
Syllabus

**Course**  
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Office Hour: Tuesday 14:00-15:00

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**Course Schedule**  
**Lecture:**  
Tuesday : 12:40 - 13:30 @ FASS G018  
Thursday : 14:40 - 16:30 @ FASS G018  
**Recitation:**  
Friday : 10:40 -12:30 @ FASS 2031

**References**  
Students are recommended to follow the references occasionally:  

**Objectives:**  
At the end of the course student must demonstrate the ability to  
- use vector algebra in calculation of forces and moments.  
- apply equilibrium equations in the solution of 2- and 3-dimensional concurrent or non-concurrent force systems.  
- solve for unknown forces and moments using both the scalar and vector methods.  
- develop appropriate free-body diagrams and to use them in solution of statics problems.  
- formulate and solve the equilibrium equations for rigid bodies made up of multiple members.  
- calculate the geometric and mass properties of interest in solid mechanics.

**Prerequisites:**  
A passing grade in NS 101, MATH 101 and MATH 102

**Course Content**  
(Tentative Schedule)  
- General Principles (Week 1)  
  - Mechanics  
  - Fundamental concepts  
  - Units of measurement  
  - SI units  
  - Numerical calculations  
  - General procedure for analysis  
- Force Vectors (Week 2)  
  - Scalars and vectors  
  - Vector operations  
  - Vector addition of forces
- Addition of a system of coplanar forces
- Cartesian vectors
- Addition of cartesian vectors
- Position vectors
- Force vector directed along a line
- Dot product

- Equilibrium of a Particle (Week 3)
  - Condition for equilibrium of a particle
  - The free-body diagram
  - Co-planar force systems
  - Three-dimensional force systems

- Force System Resultants (Week 4-5)
  - Moment of a force - scalar formulation
  - Cross product
  - Moment of a force - vector formulation
  - Principle of moments
  - Moment of a force about a specified axis
  - Moment of a couple
  - Simplification of a force and couple system
  - Reduction of a simple distributed loading

- Equilibrium of a rigid body (Week 6)
  - Conditions for rigid-body equilibrium
  - Equations of equilibrium
  - Two- and three-force members
  - Constraints and statical determinacy

- Structural Analysis (Week 7-8)
  - Simple trusses
  - The method of joints
  - Zero-force members
  - The method of sections
  - Space trusses
  - Frames and machines

- Internal Forces (Week 9-10)
  - Internal forces developed in structural members
  - Shear and moment equations and diagrams
  - Relations between distributed load, shear, and moment
  - Cables

- Friction (Week 11-12)
  - Characteristics of dry friction
  - Problems involving dry friction
  - Wedges
  - Frictional forces on screws
  - Frictional forces on flat belts
  - Frictional forces on collar bearings, pivot bearings, and disks
  - Frictional forces on journal bearings
  - Rolling resistance

- Moments of inertia (Week 13-14)
  - Definition of moments of inertia for areas
  - Parallel-axis theorem for an area
  - Radius of gyration of an area
- Moments of inertia for composite areas
- Product of inertia for an area
- Moments of inertia for an area about inclined axes
- Mass moment of inertia

**Grading Policy**  
Quiz (10%), Midterms (50%), Final Exam (40%)

- There will be around 10-20 pop-up quizzes (around 3-5 minutes) during the semester and 80% best of them will be included in your overall grade. They will be based on that day’s lecture notes.
- There will be 2 midterm exams (around 90 minutes) throughout the semester. They will be scheduled to be held during recitation hours or weekends.
- One make-up examination, covering the whole course material, will be given during the Finals Week for the students who miss any of the exams due to a valid excuse approved by the faculty/medical center. All examinations will be closed book and notes. The necessary formula will be provided to the students.
- All solutions must be written in a professional manner. You may lose points for poorly written answers.
- No extra exam/project/etc. will be given to increase your grade at the end of the semester.
- If your attendance is less than 50%, you will fail the course automatically.
- Students who miss any two exams will get N/A from the course.
- Oral exam (that will be recorded) will be given to students whose quiz/exam answers seem suspicious.

**Online Lecture Policy**
- Lectures will not be hybrid/online.
- The lecture slides will shared as pdf files. There will be empty sections in the shared files and students are expected to complete them during the class.
- Students cannot share or post to the Web any document (lecture slides, quiz/exam questions, etc.) with third parties.

**Disclaimer**
- Time conflict requests can be accepted; however, students who are registered to the course with time-conflict override accept the responsibility of any inconvenience that might occur due to missed content and/or quizzes. No make-up will be available for missed quizzes/content.
- This syllabus and course details might need to be updated throughout the semester because of the uncertainties the pandemic brings. Any modification will be announced at SUCourse+ and also during the class. Students are responsible from following the announcements.

**Academic Integrity**
- Students are expected to be familiar with and comply with Sabanci University Academic Integrity Statement. Any form of academic dishonesty (plagiarism, copying/using other people’s work, attending classes/exams on behalf of other people, etc.) will be penalized with a failing grade for the related assignment, quiz, or exam and disciplinary actions will be taken.