Course Details

Higher Education Institution

Rangsit University

Faculty/Department

College of Engineering

Section 1: General Information

1. Course Code and Title CEN223 Mechanics of Materials

2. Credit Hours

- 3
- 3. **Program and Course Type** Bachelor of Engineering, Civil Engineering Program, Professional Foundation Group
- Instructor and Teaching Group Dr. Seyed Yaser Mousavi Siamakani; email: yaser.m@rsu.ac.th
- 4. Semester / Year of Study Semester 1 or Semester 2 / 2nd Year
- 5. Prerequisite CEN221 Engineering Mechanics: Statics
- 6. **Co-requisite** None
- 7. Classroom Location College of Engineering, Rangsit University
- 8. Last Updated 19.12.2024

Section 2: Objectives and Purpose

- 1. Course Objectives
 - o Understand problem-solving processes in Strength of Materials and apply them.
 - Grasp the relationship between force, stress, and strain in axial members and beams.
 - Analyze bending stress and shear stress within the elastic range.
 - Determine reaction forces, shear forces, and bending moments in determinate beams.
 - Draw shear force and bending moment diagrams.

- Understand methods for calculating beam deflections.
- Comprehend torsional effects and column buckling analysis.
- Analyze combined stresses using Mohr's circle.
- Understand failure theories and their applications.

2. Development/Revision Objectives

- Align with the engineering curriculum standards by the Office of the Higher Education Commission.
- Meet the standards set by the Engineering Council.
- Equip students with foundational knowledge for further engineering courses.

Section 3: Course Description and Hours

1. Course Description

Covers force and stress, stress-strain relationships, stress in beams, shear force and bending moment diagrams, beam deflections, torsion, column buckling, Mohr's circle for combined stress, and failure theories.

2. Class Hours per Semester

• To be determined.

3. Instructor Consultation

Instructors provide consultation during office hours or via group/personal messages (e.g., email and Line).

Section 4: Student Learning Outcomes

1. Ethics and Morality

- o Instill discipline, responsibility, punctuality, and respect for professional ethics.
- **Teaching Methods**: Real-life examples, disciplinary guidance during class.
- Assessment: Observe student behavior and adapt teaching methods if necessary.

2. Knowledge

- Gain knowledge in stress-strain relationships, beam and column analysis, torsion, and failure theories.
- o **Teaching Methods**: Lectures, exercises, homework, and additional consultations.
- Assessment: Midterm and final exams focused on analysis and application.

3. Cognitive Skills

o Develop systematic problem-solving and integration of lesson content.

- Teaching Methods: Real-world examples, encourage independent analysis.
- Assessment: Exams emphasizing analytical and applied knowledge.

4. Interpersonal and Responsibility Skills

- Work effectively in individual and group settings.
- **Teaching Methods**: Group projects, role assignments, and class participation.
- **Assessment**: Performance in assignments, presentations, and group activities.

5. Numerical Analysis, Communication, and IT Skills

- Use mathematical, communication, and engineering tools effectively.
- **Teaching Methods**: Assignments using international resources, real-world problemsolving examples.
- **Assessment**: Evaluated through project performance and presentations.

Section 5: Teaching and Assessment Plan

1. Teaching Plan

Week	Topics and Subtopics	Hours	Activities and Resources
1	Introduction to Mechanics of Materials	3	Lectures and
	Stress		book(s)
2	Strain	3	Lectures and
			book(s)
3	Mechanical Properties of Materials	3	Lectures and
			book(s)
4	Axial load	3	Lectures and
			book(s)
5	Torsion	3	Lectures and
			book(s)
6	Bending	3	Lectures and
			book(s)
7	Transverse Shear	3	Lectures and
			book(s)
8	Mid-term exam	3	-

9	Combined Loadings	3	Lectures and
			book(s)
10	Stress and Strain Transformation	3	Lectures and
			book(s)
11	Design of Beams	3	Lectures and
			book(s)
12	Deflection of Beams	3	Lectures and
			book(s)
13	Buckling of Column	3	Lectures and
			book(s)
14	Energy Methods	3	Lectures and
			book(s)
15	Exam (pre-final)	3	-

2. Assessment Plan

	Maximum Point (%)
Attendance, Attitude	7
and Activity	
Assignment	7
Exam (mid-term)	25
Exam (pre-final)	30
Exam (final)	31
Total	100

Section 6: Learning Resources

- 1. Main Texts
 - Hibbeler, R.C., *Mechanics of Materials*, Prentice Hall, 11th Edition, 2022.
 - Ferdinand Beer et al., *Mechanics of Materials*, McGraw-Hill, 8th Edition, 2019.
 - Gere, J.M. and Goodno, B.J., *Mechanics of Materials*, Cengage Learning, 9th Edition, 2017.

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2. Supplementary Materials

o Other related texts and resources in Mechanics of Materials.

Section 7: Evaluation and Course Improvement

1. Student Feedback

• Group discussions, teaching evaluations conducted by the university's teaching support center.

2. Teaching Assessment

• Exam results and external committee evaluations.

3. Teaching Improvements

• Adjust teaching strategies based on student understanding and feedback.

4. Outcome Verification

• Exams reviewed by an external committee of experts for appropriateness and scoring.

5. Continuous Improvement

• Regularly update content and teaching materials. Adjust teaching based on student evaluations.