Course Details

Higher Education Institution

Rangsit University

Faculty/Department

College of Engineering

Section 1: General Information

- 1. Course Code and Title CEN221 Engineering Mechanics: Statics
- 2. Credits
- 3. **Program and Course Type** Bachelor of Engineering, Civil Engineering Major, Core Professional Course
- Course Instructor(s)
 Dr. Seyed Yaser Mousavi Siamakani; email: yaser.m@rsu.ac.th
- 5. Semester/Year of Study Semester 1 or Semester 2 / Year 2
- 6. Prerequisites PHY121 Physics I
- 7. **Co-requisites** None
- 8. **Course Location** College of Engineering, Rangsit University
- 9. **Date of Last Revision** 18.12.2024

Section 2: Objectives and Goals

- 1. Course Goals
 - o Understand problem-solving processes in mechanics.
 - Comprehend and apply Newton's First and Third Laws of Motion.
 - \circ $\;$ Analyze forces in structures such as trusses and frames.
 - Understand internal forces and apply them to beam analysis.
 - Comprehend and apply the principles of dry friction.
 - o Determine the center of gravity, center of mass, and centroid of areas.
 - Calculate the moment of inertia for areas.

2. Purpose of Development/Revision

- Align with the standard framework for engineering curricula established by the Office of Higher Education Commission.
- Provide a solid knowledge base for studying advanced engineering courses.

Section 3: Course Components

1. Course Description

Engineering problem-solving; application of fundamental mechanics principles; force analysis on particles and rigid bodies in equilibrium; moments, couples, structural analysis of trusses and frames; shear and bending moment in beams; friction; determination of centroids, centers of gravity, and mass; moments of inertia for areas and masses.

2. Class Hours Per Semester

Lecture	Tutorial	Fieldwork/Internship	Self-study
45 hrs	Available two weeks before midterm and final exams	None	90 hrs

3. Instructor Consultation Hours

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

Section 4: Student Learning Outcomes

1. Ethics and Morality

• Development Objectives:

Discipline, responsibility, punctuality, adherence to rules, and professional ethics awareness.

• Teaching Methods:

Use examples to emphasize professional responsibility and discipline, such as punctuality and appropriate classroom behavior.

• Assessment Methods:

Observe student behavior during class activities and adjust teaching as needed.

2. Knowledge

• Knowledge Objectives:

Understanding and application of fundamental mechanics principles and structural analysis in practical situations.

• Teaching Methods:

Lectures, in-class exercises, homework, and supplementary sessions before exams.

• Assessment Methods:

Midterm and final exams focusing on analytical and practical applications of knowledge.

3. Cognitive Skills

- Development Objectives: Ability to systematically analyze, solve problems, and develop innovative solutions.
- Teaching Methods:
 Real-world examples, encouraging independent thought and problem analysis.

• Assessment Methods:

Exam questions requiring analytical and practical knowledge application.

4. Interpersonal and Responsibility Skills

• Development Objectives:

Responsibility, teamwork, and adaptability.

• Teaching Methods:

Assign group and individual tasks, involve students in problem-solving, and encourage collaborative learning.

• Assessment Methods:

Evaluate task outcomes and behavior during class activities.

5. Numerical Analysis, Communication, and IT Skills

• Development Objectives:

Solve problems using mathematical and engineering tools, effective communication, and IT proficiency.

• Teaching Methods:

Assign research projects and encourage the use of technology for presentations and problem-solving.

• Assessment Methods:

Evaluate assignments, presentations, and classroom behavior.

Section 5: Teaching and Assessment Plan

1. Teaching Plan

Week	Topics and Subtopics	Hours	Activities and Resources
1	Introduction to Statics	3	Lectures and book(s)

2	Force Systems	3	Lectures and
	-Two-Dimensional Force Systems		book(s)
	-Rectangular Component		
	-Moment		
	-Couple		
	-Resultants		
3	Force Systems	3	Lectures and
	-Three-Dimensional Force Systems		book(s)
	-Rectangular Component		
	-Moment and Couple		
	-Resultants		
4	Equilibrium	3	Lectures and
	-Introduction		book(s)
	-Equilibrium in Two Dimensions		
	-System Isolation and the Free-Body Diagram		
5	Equilibrium	3	Lectures and
	-Equilibrium in Two and Three Dimensions		book(s)
	-System Isolation and the Free-Body Diagram		
6	Equilibrium	3	Lectures and
	-Equilibrium in Three Dimensions		book(s)
	-Equilibrium Conditions		
7	Structures	3	Lectures and
	-Introduction		book(s)
	-Plane Trusses		
	-Method of Joints		
8	Mid-term exam	3	-
9	Structures	3	Lectures and
	-Method of Sections		book(s)
10	Structures	3	Lectures and
	-Frames and Machines		book(s)
11	Distributed Forces	3	Lectures and
	-Introduction		book(s)

	-Center of Mass and Centroids		
	-Beam		
12	Distributed Forces	3	Lectures and
	-Beam		book(s)
13	Friction	3	Lectures and
	-Introduction		book(s)
	-Type of Friction		
	-Dry Friction		
14	Moment of Inertia	3	Lectures and
	-Introduction		book(s)
	-Definitions		
	-Composite Areas		
15	Exam (pre-final)	3	-

2. Assessment Plan

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

Section 6: Teaching Resources

- 1. Main Textbooks
 - o J. L. Meriam & L. G. Kraige: Engineering Mechanics: Statics, 9th Edition, Wiley, 2018.
- 2. Key References
 - **Russell C. Hibbeler:** *Engineering Mechanics: Statics (SI), 12th Edition,* Prentice-Hall, 2009.

3. Additional Resources

Related mechanics textbooks or documents on *Engineering Mechanics: Statics*.

Section 7: Course Evaluation and Improvement

1. Student Evaluation of Course Effectiveness

- Group discussions between instructors and students.
- Student feedback surveys conducted by the university's teaching support center.

2. Teaching Evaluation

- Exam results.
- External committee review of exams and scoring.

3. Teaching Improvement

• Modify teaching strategies based on evaluation feedback, such as providing more problem-solving examples or supplementary sessions.

4. Outcome Verification

 Approval of exam results by external standard committee members in the respective fields.

5. Course Review and Improvement Plan

 Regular discussions among instructors to revise course content, update textbooks, and incorporate student feedback.