Course Syllabus (Academic Year 2020)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. **Course No. and Title** : KAED 222 Engineering Mechanics

   Credit (study hours) : 3(3-0-6)

2. **Program Name** : Bachelor of Engineering Program in Environmental Engineering and Disaster management

3. **Course Module** : Major Required Courses

   Pre/co-requisite : SCMA 165 (Ordinary Differential Equations)

4. **Class Semester** : ☐ 1st Semester ☑ 2nd Semester Academic Year 2020

5. **Class Schedule & Venue** : Monday, 9:00 – 12:00,

6. **Class Coordinator** : Dr. Keerati Sripramai

   Contact No. : 081-685-0002**,** Email.:Keerati.sri@mahidol.ac.th

7. **Course Description**

Force systems, resultant, equilibrium, fluid statics, kinematics and kinetics of particles and rigid bodies, Newton's second law of motion, work and energy, impulse and momentum

8. **Course Objectives / Course Learning Outcomes (CLOs)**

No.	Objectives / CLOs	Expected Skills / Knowledge			PLOs	ABET Criteria
		Specific	Generic	Knowledge		
8.1	To enable students to understand force system and identify type of force		GS1, GS2, GS3	K1, K2	1	
8.2	To enable students to understand and calculate resultant force, equilibrium force, friction force, distributed forces, center of mass, fluid force		GS1, GS2, GS3	K1, K2	1	
8.3	To enable students to identify type of motion and force, and calculate velocity and acceleration		GS1, GS2, GS3	K1, K2, K3, K4, K5	1	
8.4	To enable students to understand		GS1, GS2,	K1, K2, K3,	1	

	and calculate force that causes the motion of particles and rigid bodies		GS3	K4, K5		
8.5	To develop skills to use the basic principles of mechanics in engineering applications	SS10, SS11	GS1, GS2, GS3, GS5, GS8	K1, K2, K3, K4, K5	1, 2	(a), (b), (c), (e)

9. Class Instructor List

Name : Dr. Keerati Sripramai Contact No. : 081-685-0002**,** Email : Keerati.sri@mahidol.ac.th

10. Course Outline

Week	Date	Contents	CLOs	Teaching & Learning method	Instructor's Names
1	18 Jan 21	Introduction	8.1,8.5	• Presentation • Activity • Group Assignment	Dr. Keerati Sripramai
2	25 Jan 21	Force systems and resultant force in two dimensions	8.1,8.2,8.5	• Presentation • Activity • Quiz	Dr. Keerati Sripramai
3	1 Feb 21	Force systems and resultant force in three dimensions	8.1,8.2,8.5	• Presentation • Activity • Assignment	Dr. Keerati Sripramai
4	8 Feb 21	Equilibrium force and Free body diagram	8.2,8.5	• Presentation • Activity • Assignment	Dr. Keerati Sripramai
5	15 Feb 21	Friction force	8.2,8.5	• Presentation • Assignment	Dr. Keerati Sripramai
6	22 Feb 21	Distributed forces and center of mass	8.2,8.5	• Presentation • Assignment	Dr. Keerati Sripramai

7	1 Mar 21	Moment of inertia	8.2,8.5	● Presentation ● Quiz	Dr. Keerati Sripramai
8	8 Mar 21	Fluid force	8.2,8.5	● Presentation ● Activity ● Assignment	Dr. Keerati Sripramai
9	Mid-term Examination (15-19 March 21)				
10	22 Mar 21	Progress project presentation (Theory)	8.3,8.5	● Presentation ● Assignment	Dr. Keerati Sripramai
11	29 Mar 21	Force and motion	8.3,8.5	● Presentation ● Assignment	Dr. Keerati Sripramai
12	5 Apr 21	Newton's second law of motion	8.3,8.5	● Presentation ● Quiz	Dr. Keerati Sripramai
13	12 Apr 21	Velocity, acceleration, motion in plane of particles and rigid bodies	8.3,8.5	● Presentation ● Assignment	Dr. Keerati Sripramai
14	19 Apr 21	Force that causes the motion of particles and rigid bodies	8.4,8.5	● Presentation ● Assignment	Dr. Keerati Sripramai
15	26 Apr 21	Project presentation (Theory)	8.1,8.2,8.3, 8.4,8.5	● Presentation	Dr. Keerati Sripramai
16	3 May 21	Lesson Review and Project presentation (Practical)	8.1,8.2,8.3, 8.4,8.5	● Presentation	Dr. Keerati Sripramai
17	Final Examination (10-21 May 21)				

11. Course Assessment

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	Mid-term exam	Subjective test ■ Content (Week 1-8) ■ Closed book ■ Faculty-approved calculator ■ 3 Hours ■ Lecture room	8.1,8.2,8.5	9	30

11.2	Final exam	Subjective test ■ Content (Week 10-16) ■ Closed book ■ Faculty-approved calculator ■ 3 Hours ■ Lecture room	8.1,8.2,8.3, 8.4,8.5	17,18	35
11.3	Assignments	9 Assignments	8.1,8.2,8.3, 8.4,8.5	3,4,5,6,8,10,11,13,14	10
11.4	Quiz	3 Quizzes	8.1,8.2,8.3, 8.4,8.5	2,7,12	5
11.5	Project	1 Project (Outputs: Model 5%, Presentation 5%, Report 5%)	8.1,8.2,8.3, 8.4,8.5	15,16	15
11.6	Class participation	Sign name and student must attend a class more than of the whole course	8.1,8.2,8.3, 8.4,8.5	1-8,10-16	5
				Total	**100**

12. Grading System

☑ Criterion-referenced evaluation

Grade	Score	Grade	Score	Grade	Score	Grade	Score
A	$\geq$ 80 %	B	70 – 74.99%	C	60 – 64.99%	D	50 – 54.99%
B+	75 – 79.99%	C+	65 – 69.99%	D+	55 – 59.99%	F	< 50 %

13. References

13.1 Meriam, J.L., Kraige, L.G., et al. (2013). *Engineering Mechanics: Statics*. (SI Edition Version 7th ed.): John Wiley& Son.

13.2 Beer, F.P., Johnston, E.R., Mazurek, D.F., (2013). *Vector Mechanics for Engineers: Statics* (10th ed.): McGraw-Hill.

13.3 Hibbeler, R.C., Kai, B.Y., (2013). *Mechanics for Engineers: Statics* (13th ed.): Pearson Education South Asia Ple Ltd.

Note:

Specific Skill (SS)	
SS10	To understand principle functions, advantages and disadvantages of each IT tool
SS11	To apply and select suitable IT tool for each scenario/situation
Generic Skill (GS)	
GS1	Systematic Thinking, Problem Solving and Analytical Skills
GS2	Basic Computer Skills
GS3	Environmental and Disaster Risk Awareness
GS5	An ability to function on multidisciplinary teams
GS8	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice
Knowledge (K)	
K1	Calculus and vector mechanics
K2	Force systems and motions
K3	Kinematics and kinetics of particles and rigid bodies
K4	Work and energy
K5	Impulse and momentum
ABET Criteria	
(a)	An ability to apply knowledge of mathematics, science, and engineering
(b)	An ability to design and conduct experiments, as well as to analyze and interpret data
(c)	An ability to design a system, component, or process to meet desired needs within and safety, manufacturability, and sustainability reality constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(e)	An ability to identify, formulate, and solve engineering problems

Project assessment					
	Consultations		Presentation	Report	Models
Grade	Apply knowledge of engineering mechanics	Participation			
A (10)	• Understand and apply the concepts are relevant knowledge. • Explain the calculation and concept design of each part of project with theory.	• Enthusiasm in work at the high level.	• Presentation the concept design clearly. • Good answer all theory and apply question. • Good and clearly presentation media.	• Show theory, concept design and calculation of each member in models clearly. • Report include objective, scope, theory, experiment,	• Appropriate materials were select and creatively modified in ways.

				result and conclusion.	
B (7.5)	• Understand the concepts are relevant knowledge.	• Make good assignment.	• Presentation the concept design clearly. • Answer some question. • Clearly presentation media.	• Show theory, concept design and calculation of each member in models. • Report include objective, scope, theory, experiment, result and conclusion.	• Appropriate materials were select.
C (5)	• Don't understand concepts design and don't show calculations.	• Don't make assignment.	• Presentation the concept design.	• Report include objective, scope, theory, experiment, result and conclusion.	• Inappropriate materials were select and contributed to product that performed poorly.