Course Specification

Name of Institution   Mahidol University

Campus/faculty/department   Salaya campus

Mahidol University International College

Science Division

Section 1 General Information

1. **Course Code and course title**
   (Thai)   EGCI 204   กลศาสตร์วิศวกรรม

   (English)   EGCI 204   Engineering Mechanics

2. **Number of Credits**   4(4-0-8) (Lecture/Lab/Self-study)

3. **Curriculum and type of subject**
   3.1 Curriculum   Bachelor of Engineering (Computer Engineering)

   3.2 Type of subject   Engineering Course (Core Engineering Major)

4. **Responsible faculty member**
   Dr. Ekachai Chaichanasiri

5. **Trimester / year of study**
   5.1 Trimester   This course will be offered upon request.

   5.2 Number of students   5-40 students

6. **Pre-requisite(s)**   ICNS 132

7. **Co-requisite(s)**   none

8. **Venue of study**   Mahidol University, Salaya campus

9. **Date of latest revision**   October 2011

Section 2 Goals and Objectives

1. **Goal**
   1.1 Apply physics and mathematics laws to solving engineering problems.
   1.2 Understand principles of mechanics in order to study advanced engineering courses.
   1.3 Analyze engineering problem systematically.

2. **Objective of development revision**
   To up-date the knowledge content of the course

Section 3 Course Management

1. **Course Description**

(Thai) ระบบแรงต่างๆ ผลลัพธ์ สมดุล สถิตยศาสตร์ของไหล จลนศาสตร์และจลนพลศาสตร์ของอนุภาคและ

วัตถุเกร็ง กฎการเคลื่อนที่ข้อที่สองของนิวตัน

(English) Force system; resultant; equilibrium; fluid statics; kinematics and kinetics of particles and rigid bodies; Newton's second law of motion.

2. **Credit hours / trimester**

Lecture (hours)	Additional Class (hours)	Laboratory/field trip/internship (hours)	Self-study (hours)
44 hours (4 hours x 11 weeks)	-	-	88 hours (8hours x 11 weeks)

3. **Numbers of hours that the lecturer provides individual counseling and guidance**
   1 hour/week

Section 4 Development of Students' Learning Outcome

1. **Expected outcome on students' skill and knowledge**

   Student will be able to apply the knowledge from lecturer and additional research with the ideas received from analysis and synthesis to set up solutions / precautions to benefit individuals and their community.

2. **Teaching Methods**
   - Lecture
   - Self-study

3. **Evaluation methods**

   1. **Morality and Ethics**

      3.1 *Expected outcome on morality and ethics:*

      1.1.1   To be aware of values and morality, ethics, scarification and honesty.
      ○ 1.1.2   To process self-discipline, punctuality, self-responsibility and social responsibility
      1.1.3   To process leadership and supporter skills and be able to work in a team with integrity and cooperation.
      1.1.4   To demonstrate good listening behavior and have respect for the rights and value of others.
      1.1.5   To pay respect to the rule of organization and social.
      1.1.6   To demonstrate the ability to analyze ethical impacts of computer usage to personals, organizations and social.
      ● 1.1.7   To demonstrate good academic ethical behaviors.

      1.2 *Teaching methods:*

      Learning Centered Education: Emphasis on knowledge development, important skills in career development and living, encourage students to use their full potentials

      1.2.1 Lecture
      1.2.2 Emphasis on morality and ethics
      1.2.3 Group discussion

      1.3   *Evaluation methods:*
      1.3.1 Written examination
      1.3.2 Class attendance, class participation and behavior in class
      1.3.3 On-time submission of reports and assignments and their quality

      2   **Knowledge development**

   1.2   *Expected outcome on knowledge development:*

● 2.1.1 To process the knowledge related to principles, theories and practice in the course

2.1.2 To be able to analyze, understand and explain the computer requirements and be able to apply knowledge and skills using the appropriate tools to solve a problem.

2.1.3 To be able analyze, design and install and/or evaluate computer components to meet the requirements of the users

○ 2.1.4 To have the ability to remain current in research, and pursue new knowledge and perform ability to apply the knowledge.

2.1.5 To know, understand and perform eagerness to develop computer knowledge and skills continuously.

2.1.6 To have a breadth knowledge in order to oversee the changes and understand the impact of new technology.

2.1.7 To have a hand-on experience in software development and/or software applications.

○ 2.1.8 To demonstrate knowledge integration with other related sciences.

2.2 *Teaching methods:*

Learning Centered Education: Emphasis on knowledge development, important skills in career development and living, encourage students to use their full potentials

2.2.1 Lecture and in-class participation
2.2.2 Self study

2.3 *Evaluation methods:*
2.3.1 Written examination
2.3.2 Quality of assignments

3. Intellectual development

3.1 *Expected outcome on intellectual development:*

● 3.1.1 To have discretionary and systematic thinking skill.

3.1.2 To have the ability to search, consolidate and evaluate ideas and evidence for problem solving.

○ 3.1.3 To be able to apply knowledge and experience to analyze and creatively solve problems both in general and in academic contexts.

3.1.4 To be able to apply knowledge and experience to synthesize solution and precautions

3.2 *Teaching method:*
3.2.1 Systematic problem solving examples and case studies
3.2.2 Self Study

3.3 *Evaluation methods:*
      3.3.1   Written examination
      3.3.2   Quality of assignments

4.   Interpersonal relationship and responsibility

4.1 *Expected outcome on interpersonal relationship and responsibility:*

      4.1.1   To perform good communication skills with various groups of people.
      4.1.2   To be a constructive team member (in various roles).
      4.1.3   To process the knowledge of the course to identify social problems.
●   4.1.4   To demonstrate self and team responsibility.
○   4.1.5   To have initiative in problem solving.
      4.1.6   To take responsibility in a life-long learning.

4.2 *Teaching methods:*
      4.2.1   Group discussion in case studies
      4.2.2   Group discussion
      4.2.3   Group assignment

4.3 *Evaluation methods:*
      4.3.1   Presentation
      4.3.2   Class attendance, class participation and behavior in class
      4.3.3   On-time submission of reports and assignments and their quality

5. Mathematical analytical thinking, communication skills and information technology skills

5.1 *Expected outcome on mathematical analytical thinking, communication skills and information technology skills:*

      5.1.1   To be able to select and apply existing tools for computer related work.
● 5.1.2   To possess the ability to apply information technology for data gathering, processing, interpreting and presenting information/results.
      5.1.3   To have the ability to communicate effectively and select appropriate methods for presentation.
○ 5.1.4   To use information technology appropriately.

5.2 *Teaching methods:*

      5.1.5   Group discussion
      5.1.6   Assignment
      5.1.7   Self Study

5.2 *Evaluation methods:*
      5.2.1   Written examination

5.2.2 Presentation with appropriate technology
5.2.3 Class attendance, class participation and behavior in class
5.2.4 On-time submission of reports and assignments and their quality

Section 5 Teaching and Evaluation Plans

1. **Teaching plan**

week	Topics	Hours			Teaching methods/multi media	Instructor
		Lecture	Lab	Self-Study		
1	Introduction to engineering mechanics Forces system •2 - dimensional forces and rectangular component •2 - dimensional moments and couples	4	-	8	Lecture and exercises	Guest instructors from the Department of Computer or Mechanical Engineering, Faculty of Engineering, Mahidol university
2	Forces system (cont.) • 3 - dimensional forces and rectangular component • 3 - dimensional moments and couples	4	-	8	Lecture and exercises	
3	Forces system (cont.) • 2 and 3 - dimensional resultants	4	-	8	Lecture and exercises	
4	Equilibrium •System isolation and the free-body diagram •2 - dimensional equilibrium conditions •3 - dimensional equilibrium conditions •Frames and machines	4	-	8	Lecture and exercises	
5	Equilibrium (cont.) • Fluid statics • Frictional phenomena	4	-	8	Lecture and exercises	

week	Topics	Hours			Teaching methods/multi media	Instructor
		Lectu re	**Lab**	**Self- Study**		
6	Midterm Examination Kinematics of particles •Rectilinear motion •Plane curvilinear motion •Rectangular coordinates				Lecture and exercises	Guest instructors from the Department of Computer or Mechanical Engineering, Faculty of Engineering, Mahidol university
7	Kinematics of particles (cont.) • Normal and tangential coordinates • Polar coordinates • Relative motion (translating axes) • Constrained motion of connected particles	4	-	8	Lecture and exercises	
8	Kinetics of particles • Newton's second law of motion • Equation of motion • Rectilinear motion • Curvilinear motion Kinematics of rigid bodies • Plane motion • Rotation • Absolute motion	4	-	8	Lecture and exercises	
9	Kinematics of rigid bodies (cont.) • Relative velocity • Instantaneous center of zero velocity • Relative acceleration	4	-	8	Lecture and exercises	
10	Kinematics of rigid bodies (cont.) • Motion relative to rotating axes Mass moments of inertia about an axis	4	-	8	Lecture and exercises	
11	Kinetics of rigid bodies • Newton's second law • General equations of motion • Translation • Fixed - axis rotation • General plane motion	4	-	8	Lecture and exercises	

week	Topics	Hours			Teaching methods/multi media	Instructor
		Lecture	Lab	Self-Study		
	Total	44	-	88		

2. Evaluation Plan

Expected outcomes	Methods / activities	Week	Percentage
1.1.2, 1.1.7, 4.1.4, 4.1.5	Attendance and in class behavior	1-11	10%
1.1.2,1.1.7, 2.1.1,2.1.4, 2.1.8, 3.1.1, 3.1.3, 4.1.4, 4.1.5, 5.1.2, 5.1.4	Assignments, Report and Presentation	1-11	10%
1.1.7, 2.1.1, 2.1.8, 3.1.3	Exams	6,12	80%

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Section 6 Teaching Materials and Resources

1. **Texts and main documents**

   Engineering Mechanics (Statics and Dynamics) 6th ed. by J.L.Meriam and L.G. Kraige

   Engineering Mechanics (Statics and Dynamics) 11th ed. by R.C. Hibbeler

2. **Documents and important information**

3. **Documents and recommended information**

Section 7 Evaluation and Improvement of Course Management

1. **Strategies for effective course evaluation by students**

   1.1 Evaluation of peers by students

   1.2 Student evaluation

       1.2.1   Course content

       1.2.2   Course management

       1.2.3   Suggestions

       1.2.4   Overall opinion

2. **Evaluation strategies in teaching methods**

   2.1 Student evaluation

   2.2 Presentation

3. **Improvement of teaching methods**

   Workshop on course improvement with the participation of all instructors in the course

4. **Evaluation of students' learning outcome**

   Analysis of students' learning outcomes using scores from class attendance, group activity and presentation.

5. **Review and improvement for better outcome**

   Review the course before trimester starts and before each teaching period

Symbol ● represents main responsibility / Symbol ○ represents minor responsibility/ Space represents no responsibility

These symbols will appear in Curriculum Mapping