Course Title	ADVANCED DYNAMICS	Instructor	LIU CHAO-HWA
Course Class	TEBXM1A MASTER'S PROGRAM, DEPARTMENT OF MECHANICAL AND ELECTRO-MECHANICAL ENGINEERING, 1A	Details	◆ General Course ◆ Selective ◆ One Semester
Relevance to SDGs	SDG8 Decent work and economic growth SDG9 Industry, Innovation, and Infrastructure		

Departmental Aim of Education

Ⅰ. To prepare students who have a comprehensive understanding of the principles of applied sciences and engineering to be innovators in the field of mechanical and electromechanical engineering.

Ⅱ. To train emerging professionals who possess a high level of expertise and ethical standards who will become independent research and development leaders in the industry.

Ⅲ. To motivate students who will pursue continuing education as a means to stay on the cutting edge of global competiveness and meet changes in their careers and the workplace with confidence and ease.

Subject Departmental core competences

A. Head: Knowledge of mechanical and electromechanical engineering.(ratio:40.00)

B. Hand: Hands-on skills and practical realization.(ratio:30.00)

C. Heart: Love of learning and innovation.(ratio:20.00)

D. Eye: Vision of progress and improvements.(ratio:10.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:10.00)

2. Information literacy. (ratio:20.00)

3. A vision for the future. (ratio:20.00)

4. Moral integrity. (ratio:5.00)

5. Independent thinking. (ratio:30.00)

6. A cheerful attitude and healthy lifestyle. (ratio:5.00)

7. A spirit of teamwork and dedication. (ratio:5.00)

8. A sense of aesthetic appreciation. (ratio:5.00)

	Course Introduction	The objective of this course is to introduce spatial kinematics and kinetics of rigid bodies. In kinetic analysis, Newton-Euler equations, Lagrange's equations of motion, and principle of virtual power will be discussed. Students are expected to be very active in studying this course. From time to time, they will be asked to answer questions or to solve an exercise during the class.

The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.

Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.

I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.

II. Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.

III. Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.

No.	Teaching Objectives	objective methods
1	Students may be able to perform position, velocity, and acceleration analysis on spatial rigid bodies	Cognitive
2	Students may be able to perform kinetic analysis on spatial rigid bodies by using Newton-Euler equations.	Cognitive
3	Students may be able to perform kinetic analysis on spatial rigid bodies by using Lagrange's equations.	Cognitive
4	Students may be able to perform kinetic analysis on spatial rigid bodies by using principle of virtual power.	Cognitive
5	Enhancing students' ability in reading technical English especially in the realm of dynamics.	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCD	12345678	Lecture	Testing, Home work
2	ABCD	12345678	Lecture	Testing, Homework
3	ABCD	12345678	Lecture	Testing, Homework
4	ABCD	12345678	Lecture	Testing, Homework

5	ABCD	12345678	Reading	Study Assignments

Course Schedule

Week	Date	Course Contents	Note
1	112/02/13～112/02/19	Basic Principles of Dynamics (2.2-2.4)	
2	112/02/20～112/02/26	Kinematics(3.5-3.6)	
3	112/02/27～112/03/05	Kinematics(3.5-3.6)	
4	112/03/06～112/03/12	Kinematics(3.7-3.8)	
5	112/03/13～112/03/19	Kinematics(3.7-3.8)	
6	112/03/20～112/03/26	Principles of D'Alembert, Virtual Power, and Lagrange's Equations (4.1-4.2)	
7	112/03/27～112/04/02	Principles of D'Alembert, Virtual Power, and Lagrange's Equations (4.3)	
8	112/04/03～112/04/09	Teaching Observation Period	
9	112/04/10～112/04/16	Principles of D'Alembert, Virtual Power, and Lagrange's Equations (4.5-4.6)	
10	112/04/17～112/04/23	Mid-term Exam.	
11	112/04/24～112/04/30	Rigid Body Dynamics (5.2)	
12	112/05/01～112/05/07	Rigid Body Dynamics (5.3)	
13	112/05/08～112/05/14	Rigid Body Dynamics (5.4)	
14	112/05/15～112/05/21	Rigid Body Dynamics (5.5-5.6)	
15	112/05/22～112/05/28	Rigid Body Dynamics (5.5-5.6)	
16	112/05/29～112/06/04	Introduction to Robotics and Multibody Dynamics (6.1-6.3)	
17	112/06/05～112/06/11	Introduction to Robotics and Multibody Dynamics (6.3-6.5)	
18	112/06/12～112/06/18	Final Exam.	
Requirement		1. Homework assignment every week. Please hand in next week before the class begins. 2. The course moves at a fast pace. Absence of one class may make a student difficult to catch up.	

Teaching Facility	Computer, Projector
Textbooks and Teaching Materials	Moon, F. C., Applied Dynamics: With Applications to Multibody and Mechatronic Systems, 2nd ed., Weinheim : Wiley-VCH, 2008.
References	1. Tsai, Lung-Wen, Robot Analysis: The mechanics of Serial and Parallel Manipulators, John-Wiley, 1999. 2. Ginsberg, J. H., Engineering Dynamics, Cambridge University Press, 2008. 3. Meriam, J. L., Kraige, L. G., and Bolton., Engineering Mechanics— Dynamics, 9'th edition, SI version, John Wiley & Sons Inc., USA, 2020.
Number of Assignment(s)	(Filled in by assignment instructor only)
Grading Policy	◆ Attendance： ％ ◆ Mark of Usual： ％ ◆ Midterm Exam： 30.0 ％ ◆ Final Exam： 30.0 ％ ◆ Other〈Homework〉：40.0 ％
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php . ※ **Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.**