Tamkang University Academic Year 113, 2nd Semester Course Syllabus

Course Title	ADVANCED DYNAMICS	Instructor	TYAN FENG
Course Class	TENXM1A MASTER'S PROGRAM, DEPARTMENT OF AEROSPACE ENGINEERING, 1A	Details	◆ General Course ◆ Selective ◆ One Semester ◆ 2 Credits
Relevance to SDGs	SDG4 Quality education SDG9 Industry, Innovation, and Infrastructure		

Departmental Aim of Education

Ⅰ. To lay down a concrete foundation of professional ethics in aerospace and aeronautical engineering, and to cultivate the students' ability in multidisciplinary expertise and continuous learning.

Ⅱ. To setup the students' hands-on ability of and the ability in resolving problem, so that both practical implementations and theories can be emphasized.

Ⅲ. To foster students with diligent and sociable attitude in work, and broadeded international perspective.

Subject Departmental core competences

A. To equip with specific aerospace engineering knowledge and expertise.(ratio:25.00)

B. Be able to master information, capable of utilizing computer to assist solving problems, and possess the ability of conducting learning new knowledge.(ratio:25.00)

C. Be able to design and conduct experiments as well as to analyze, and to solve practical aerospace related engineering problems.(ratio:25.00)

D. Be able to write professional research papers in the field of aerospace engineering. (ratio:10.00)

E. Have a creative thinking, complete analyzing, effective communication, the spirit of teamwork and the ability to solve industrial problems.(ratio:15.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:15.00)
2. Information literacy. (ratio:25.00)
3. A vision for the future. (ratio:15.00)
4. Moral integrity. (ratio:5.00)
5. Independent thinking. (ratio:25.00)
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	Newton/Euler and Lagrangian formulations for three dimensional motion of particles and rigid bodies. Principles of dynamics applied to various rigid-body and multi-body dynamics problems that arise in aerospace and mechanical engineering. Hamilton's equations, canonical transformations, and Hamilton-Jacobi theory. Applications to orbital problems. General perturbation theory.

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	Kinematics of a particle	Cognitive
2	Dynamics of a particle	Cognitive
3	Dynamics of system particles	Cognitive
4	Lagrange’ s equation	Cognitive
5	Basic concept of rigid body	Cognitive
6	Dynamics of rigid body	Cognitive

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

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCDE	12345678	Lecture, Discussion, Practicum	Testing, Study Assignments, Discussion(including classroom and online), Practicum

2	ABCDE	12345678	Lecture, Discussion, Practicum	Testing, Study Assignments, Discussion(including classroom and online), Practicum
3	ABCDE	12345678	Lecture, Discussion	Testing, Study Assignments, Discussion(including classroom and online), Practicum
4	ABCDE	12345678	Lecture, Discussion, Practicum	Testing, Study Assignments, Discussion(including classroom and online), Practicum
5	ABCDE	12345678	Lecture, Discussion	Testing, Study Assignments, Discussion(including classroom and online), Practicum
6	ABCDE	12345678	Lecture, Discussion, Practicum	Testing, Study Assignments, Discussion(including classroom and online), Practicum

Course Schedule

Week	Date	Course Contents	Note
1	114/02/17 ~ 114/02/23	Introductory Concepts, Kinematics of a Particle	
2	114/02/24 ~ 114/03/02	Kinematics of a Particle	
3	114/03/03 ~ 114/03/09	Dynamics of a Particle	
4	114/03/10 ~ 114/03/16	Dynamics of System Particles	
5	114/03/17 ~ 114/03/23	Dynamics of System Particles	
6	114/03/24 ~ 114/03/30	Lagrange's Equation	
7	114/03/31 ~ 114/04/06	Lagrange's Equation	
8	114/04/07 ~ 114/04/13	Lagrange's Equation	
9	114/04/14 ~ 114/04/20	Midterm Exam	
10	114/04/21 ~ 114/04/27	Basic Concept of Rigid Body	
11	114/04/28 ~ 114/05/04	Basic Concept of Rigid Body	
12	114/05/05 ~ 114/05/11	Basic Concept of Rigid Body	

13	114/05/12 ~ 114/05/18	Dynamics of Rigid Body	
14	114/05/19 ~ 114/05/25	Dynamics of Rigid Body	
15	114/05/26 ~ 114/06/01	Dynamics of Rigid Body	
16	114/06/02 ~ 114/06/08	Vibration	
17	114/06/09 ~ 114/06/15	Vibration	
18	114/06/16 ~ 114/06/22	Final Exam	

Key capabilities	self-directed learning International mobility Problem solving Interdisciplinary
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)
Distinctive teaching	Learning technologies (such as AR/VR,etc.) incorporated to physical courses
Course Content	Logical Thinking AI application
Requirement	1. Attend every class on time. 2. Work diligently 3. Students should be acquainted with “Matlab® “software.
Textbooks and Teaching Materials	Self-made teaching materials:Textbooks, Handouts Using teaching materials from other writers:Textbooks, Handouts, Videos
References	1. F. C. Moon, “Applied Dynamics with Application to Multibody and Mechatronic Systems,” John Wiley & Sons, Inc., 1998. 2. H. Baruh, “Analytical Dynamics,” McGraw-Hill, 1999. 3. ADAMS User's Manual
Grading Policy	◆ Attendance： % ◆ Mark of Usual： % ◆ Midterm Exam： 35.0 % ◆ Final Exam： 50.0 % ◆ Other〈Home work〉：15.0 %

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.**