Tamkang University Academic Year 114, 1st Semester Course Syllabus

Course Title	DESIGN AND APPLICATIONS OF ADDITIVE MANUFACTURING	Instructor	YEN-TING LI
Course Class	TEBXM1A MASTER'S PROGRAM, DEPARTMENT OF MECHANICAL AND ELECTRO-MECHANICAL ENGINEERING, 1A	Details	◆ General Course ◆ Selective ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG4 Quality education		

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:10.00)

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

C. Heart: Love of learning and innovation.(ratio:30.00)

D. Eye: Vision of progress and improvements.(ratio:30.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:10.00)

2. Information literacy. (ratio:10.00)

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:25.00)

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

Course Introduction	This course introduces the fundamental principles, design methods, and applications of additive manufacturing (commonly known as 3D printing). Students will learn about various additive manufacturing technologies, Fused Deposition Modeling (FDM), Selective Laser Sintering (SLS), Stereolithography (SLA), and Binder Jetting(BJ), understanding the advantages, disadvantages, and appropriate use cases for each technology.

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	Understand the basic principles and technical details of additive manufacturing.	Cognitive
2	Learn design considerations for additive manufacturing, including material selection and structural design.	Cognitive
3	Explore the applications of additive manufacturing in different industries such as aerospace, healthcare, automotive, and consumer products.	Cognitive
4	Develop skills in using CAD software to design 3D models and convert designs into printable files.	Cognitive
5	Analyze challenges and future trends in additive manufacturing.	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, Discussion	Discussion(including classroom and online), Report(including oral and written)

2	ABCD	12345678	Lecture, Discussion	Testing, Discussion(including classroom and online), Report(including oral and written)
3	ABCD	12345678	Lecture, Discussion	Testing, Discussion(including classroom and online), Report(including oral and written)
4	ABCD	12345678	Lecture, Discussion	Testing, Discussion(including classroom and online), Report(including oral and written)
5	ABCD	12345678	Lecture, Discussion	Testing, Discussion(including classroom and online), Report(including oral and written)

Course Schedule

Week	Date	Course Contents	Note
1	114/09/15 ~ 114/09/21	Course Introduction and Overview of Additive Manufacturing (AM) I	
2	114/09/22 ~ 114/09/28	Course Introduction and Overview of Additive Manufacturing (AM) II	
3	114/09/29 ~ 114/10/05	Fused Deposition Modeling (FDM) & Stereolithography (SLA)	
4	114/10/06 ~ 114/10/12	Selective Laser Sintering (SLS) & Binder Jetting (BJ)	
5	114/10/13 ~ 114/10/19	Material Selection for Additive Manufacturing	
6	114/10/20 ~ 114/10/26	Material Selection for Additive Manufacturing	
7	114/10/27 ~ 114/11/02	Design Considerations for Additive Manufacturing	
8	114/11/03 ~ 114/11/09	Midterm Examination	
9	114/11/10 ~ 114/11/16	How to Perform Literature Search?	
10	114/11/17 ~ 114/11/23	How to Create a Presentation?	
11	114/11/24 ~ 114/11/30	What is your 3D printing design? Can it be applied to your research?	
12	114/12/01 ~ 114/12/07	Applications in Aerospace	
13	114/12/08 ~ 114/12/14	Applications in Healthcare	

14	114/12/15 ~ 114/12/21	Applications in Automotive Industry	
15	114/12/22 ~ 114/12/28	Applications in Consumer Products	
16	114/12/29 ~ 115/01/04	Future Trends in Additive Manufacturing & 4D printing	
17	115/01/05 ~ 115/01/11	Individual Report & Discussion	
18	115/01/12 ~ 115/01/18	Flexible Use	

Key capabilities	self-directed learning Problem solving
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)
Distinctive teaching	
Course Content	Logical Thinking
Requirement	
Textbooks and Teaching Materials	Using teaching materials from other writers:Textbooks, Presentations
References	Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing Theory and Practice of Additive Manufacturing Additive Manufacturing Technology – Design, Optimization, an (Hardback) Design for Additive Manufacturing: Concepts and Considerations
Grading Policy	◆ Attendance： %　◆ Mark of Usual：40.0 %　◆ Midterm Exam： 25.0 % ◆ Final Exam： 35.0 % ◆ Other〈 〉： %

Note	This syllabus may be uploaded at the website of Course Syllabus Management System at https://web2.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. ※"Adhere to the concept of intellectual property rights" and "Do not illegally photocopy, download, or distribute." Using original textbooks is advised. It is a crime to improperly photocopy others' publications.