

## Tamkang University Academic Year 104, 1st Semester Course Syllabus

Course Title	AIRCRAFT DESIGN (I)	Instructor	WAN TUNG
Course Class	TENXB4A DEPARTMENT OF AEROSPACE ENGINEERING, 4A	Details	<ul style="list-style-type: none"> <li>◆ Required</li> <li>◆ One Semester</li> <li>◆ 3 Credits</li> </ul>
Departmental Aim of Education			
<ul style="list-style-type: none"> <li>I. Apply scientific knowledge and engineering techniques to analyze and solve fundamental aerospace engineering problem.</li> <li>II. Through fundamental theory to design and implement experiments, and be able to analyze experimental data.</li> <li>III. Maintain the spirit of independent thinking, self-elevate, and continuous learning.</li> <li>IV. Uphold the responsible attitude of work ethics and team work.</li> <li>V. Will have access to information, using basic knowledge, diversification, and better ability to adapt to circumstances.</li> </ul>			
Departmental core competences			
<ul style="list-style-type: none"> <li>A. With basic aerospace engineering expertise.</li> <li>B. Able to solve basic engineering problems via fundamental theory.</li> <li>C. Capable of lifelong learning and research capacity for further studies.</li> <li>D. To work with a sense of mission and responsibility.</li> <li>E. Have team spirit and the ability to communicate with each other.</li> <li>F. With an international perspective, have the ability to connect with the world.</li> <li>G. Taking full advantage of information and utilization of computer-assisted problem solving skills.</li> </ul>			
Course Introduction	The course is to provide the students a working knowledge of the basic conceptual design for modern flight vehicles. The topics include design goal selection, review of aerodynamics, aircraft performance evaluation, take-off weight calculation, wing loading estimation, airfoil/wing and fuselage design, take-off/landing field length calculation, selection of engine, landing gear, horizontal and vertical tails, etc.		

## The Relevance among Teaching Objectives, Objective Levels and Departmental core competences

I. Objective Levels (select applicable ones) :

- |                         |                                     |                           |
|-------------------------|-------------------------------------|---------------------------|
| (i) Cognitive Domain    | : C1-Remembering, C2-Understanding, | C3-Applying,              |
|                         | C4-Analyzing, C5-Evaluating,        | C6-Creating               |
| (ii) Psychomotor Domain | : P1-Imitation, P2-Mechanism,       | P3-Independent Operation, |
|                         | P4-Linked Operation, P5-Automation, | P6-Origination            |
| (iii) Affective Domain  | : A1-Receiving, A2-Responding,      | A3-Valuing,               |
|                         | A4-Organizing, A5-Characterizing,   | A6-Implementing           |

II. The Relevance among Teaching Objectives, Objective Levels and Departmental core competences :

- (i) Determine the objective level(s) in any one of the three learning domains (cognitive, psychomotor, and affective) corresponding to the teaching objective. Each objective should correspond to the objective level(s) of ONLY ONE of the three domains.
- (ii) If more than one objective levels are applicable for each learning domain, select the highest one only. (For example, if the objective levels for Cognitive Domain include C3, C5, and C6, select C6 only and fill it in the boxes below. The same rule applies to Psychomotor Domain and Affective Domain.)
- (iii) Determine the Departmental core competences that correspond to each teaching objective. Each objective may correspond to one or more Departmental core competences at a time. (For example, if one objective corresponds to three Departmental core competences: A, AD, and BEF, list all of the three in the box.)

No.	Teaching Objectives	Relevance	
		Objective Levels	Departmental core competences
1	1 Working knowledge of the basic conceptual design for modern flight vehicles  2 To develop the ability of analyzing and application engineering problems with mathematical and physical theorems in modern aircraft design, create and design one's own flight vehicle	C6	ABCDEFGG

### Teaching Objectives, Teaching Methods and Assessment

No.	Teaching Objectives	Teaching Methods	Assessment
1	1 Working knowledge of the basic conceptual design for modern flight vehicles  2 To develop the ability of analyzing and application engineering problems with mathematical and physical theorems in modern aircraft design, create and design one's own flight vehicle	Lecture, Discussion, Simulation, Practicum, Problem solving	Written test, Practicum, Report, Participation

This course has been designed to cultivate the following essential qualities in TKU students

Essential Qualities of TKU Students	Description
◆ A global perspective	Helping students develop a broader perspective from which to understand international affairs and global development.
◆ Information literacy	Becoming adept at using information technology and learning the proper way to process information.
◆ A vision for the future	Understanding self-growth, social change, and technological development so as to gain the skills necessary to bring about one's future vision.
◆ Moral integrity	Learning how to interact with others, practicing empathy and caring for others, and constructing moral principles with which to solve ethical problems.
◆ Independent thinking	Encouraging students to keenly observe and seek out the source of their problems, and to think logically and critically.
◆ A cheerful attitude and healthy lifestyle	Raising an awareness of the fine balance between one's body and soul and the environment; helping students live a meaningful life.
◆ A spirit of teamwork and dedication	Improving one's ability to communicate and cooperate so as to integrate resources, collaborate with others, and solve problems.
◆ A sense of aesthetic appreciation	Equipping students with the ability to sense and appreciate aesthetic beauty, to express themselves clearly, and to enjoy the creative process.

#### Course Schedule

Week	Date	Subject/Topics	Note
1	104/09/14 ~ 104/09/20	Introduction to design concept and aircraft design elements	
2	104/09/21 ~ 104/09/27	Review of aerodynamics	
3	104/09/28 ~ 104/10/04	Review of aircraft performance	
4	104/10/05 ~ 104/10/11	Aircraft operation envelop consideration	
5	104/10/12 ~ 104/10/18	Take-off weight estimation	
6	104/10/19 ~ 104/10/25	Wing loading estimation	
7	104/10/26 ~ 104/11/01	Selection of airfoil and wing planform	
8	104/11/02 ~ 104/11/08	Fuselage sizing and design	
9	104/11/09 ~ 104/11/15	High lift devices	
10	104/11/16 ~ 104/11/22	Midterm Exam Week	
11	104/11/23 ~ 104/11/29	Take-off and landing analysis	
12	104/11/30 ~ 104/12/06	Wing-body aerodynamic consideration	

13	104/12/07 ~ 104/12/13	Sizing of vertical and horizontal tails	
14	104/12/14 ~ 104/12/20	Turbine engine fundamentals and engine selection	
15	104/12/21 ~ 104/12/27	Landing gear selection, aircraft material selection	
16	104/12/28 ~ 105/01/03	Stability and control consideration, control surfaces design	
17	105/01/04 ~ 105/01/10	Intro. to advance topics: Blended-wing-body, Joined wing, Flapping wing vehicles	
18	105/01/11 ~ 105/01/17	Final Exam Week	
Requirement	Class evaluation (including homework assignments and quiz): 25 % Do not know what's "mark of usual".		
Teaching Facility	Computer		
Textbook(s)	1.P. M. Sforza, "Commercial Airplane Design Principles", 2014. Elsevier Aerospace Series. 2.L. M. Nicolai, "Fundamentals of Aircraft Design" , 1975		
Reference(s)	1. Daniel Raymer, "Aircraft Design: a Conceptual Approach" , AIAA, 2nd Edition, 2009 2. Jan Roskam, "Airplane Design" , Roskam Aviation Co., 1989		
Number of Assignment(s)	6 (Filled in by assignment instructor only)		
Grading Policy	◆ Attendance :            %    ◆ Mark of Usual : 25.0 %    ◆ Midterm Exam : 20.0 % ◆ Final Exam :    30.0 % ◆ Other (Final report) : 25.0 %		
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at <a href="http://info.ais.tku.edu.tw/csp">http://info.ais.tku.edu.tw/csp</a> or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at <a href="http://www.acad.tku.edu.tw/CS/main.php">http://www.acad.tku.edu.tw/CS/main.php</a> . <b>※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.</b>		