Tamkang University Academic Year 108, 1st Semester Course Syllabus

Course Title	DIGITAL CONTROL SYSTEM	Instructor	TYAN FENG
Course Class	TENXM1A MASTER'S PROGRAM, DEPARTMENT OF AEROSPACE ENGINEERING, 1A	Details	◆ General Course ◆ Selective ◆ One Semester

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:30.00)

2. Information literacy. (ratio:30.00)

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

5. Independent thinking. (ratio:20.00)

Course Introduction	Digital control system provides the insight, knowledge, and understanding required to analyze and design computer-controlled systems, from theory to practical implementation. This course includes an introduction to sampled-data control systems, discretization of analog systems, discrete-time systems, time-invariance, Z-transforms, stability, state-space models, pole assignment, deadbeat control. In particular, students will learn about modelling and analyzing feedback control systems in which the plant is an analogue, continuous-time system, but where the controller is a digital computer.

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	Introductory of Digital Control	Cognitive
2	familiar with Discrete system analysis, discrete equvalents, Z-transform	Cognitive
3	Design using state-space method, multivariable and optimal control	Cognitive
4	System identification, nonlinear control and case study	Cognitive

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

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCDE	1235	Lecture, Discussion	Testing, home work
2	ABCDE	1235	Lecture, Discussion	Testing, home work
3	ABCDE	1235	Lecture, Discussion	Testing, home work
4	ABCDE	1235	Lecture, Discussion	Testing, home work

Course Schedule

Week	Date	Course Contents	Note
1	108/09/09 ~ 108/09/15	Introduction, Review of Continuous Time System	

2	108/09/16 ~ 108/09/22	Introductory of Digital Control	
3	108/09/23 ~ 108/09/29	Discrete System Analysis	
4	108/09/30 ~ 108/10/06	Sampled-Data Systems	
5	108/10/07 ~ 108/10/13	Discrete Equivalents	
6	108/10/14 ~ 108/10/20	Design Using Transform Techniques	
7	108/10/21 ~ 108/10/27	Design Using State-Space Methods	
8	108/10/28 ~ 108/11/03	Design Using State-Space Methods	
9	108/11/04 ~ 108/11/10	Midterm Exam	
10	108/11/11 ~ 108/11/17	Multivariable and Optimal Control	
11	108/11/18 ~ 108/11/24	Multivariable and Optimal Control	
12	108/11/25 ~ 108/12/01	Quantization Effects, Sample Rate Selection	
13	108/12/02 ~ 108/12/08	System Identification	
14	108/12/09 ~ 108/12/15	System Identification	
15	108/12/16 ~ 108/12/22	Nonlinear Control	
16	108/12/23 ~ 108/12/29	Nonlinear Control	
17	108/12/30 ~ 109/01/05	case study	
18	109/01/06 ~ 109/01/12	Final Exam	

Requirement	Work Hard, Make yourself be familiar with MATLAB.
Teaching Facility	Computer, Projector, Other (MATLAB)
Textbooks and Teaching Materials	T.B.D.
References	G. F. Franklin, J. D. Powell and M. Workman, "Digital Control of Dynamic Systems," 3rd ed, Addision Wesley, 1998

Number of Assignment(s)	6 (Filled in by assignment instructor only)
Grading Policy	◆ Attendance： % ◆ Mark of Usual：15.0 % ◆ Midterm Exam： 35.0 % ◆ Final Exam： 50.0 % ◆ Other〈 〉： %
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.**