

Tamkang University Academic Year 113, 2nd Semester Course Syllabus

Course Title	HARDWARE SOFTWARE CODESIGN	Instructor	HO, CHENG-CHANG
Course Class	TETJM1A MASTER'S PROGRAM IN ARTIFICIAL INTELLIGENCE ROBOTICS, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, 1A	Details	<ul style="list-style-type: none"> ◆ General Course ◆ Selective ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG1 No poverty SDG4 Quality education		
Departmental Aim of Education			
<ul style="list-style-type: none"> I. Educate students to have electrical and robotic engineering knowledge to solve electrical engineering related problems. II. Educate the student as a senior electrical and robotic engineer to enable creative thinking, to be independently complete the assigned tasks and be willing to work as a team member. III. Educate students to have advanced global awareness to cope with the challenges of modern diversified professor careers. 			
Subject Departmental core competences			
<ul style="list-style-type: none"> A. Core competency 1.1: Have professional knowledge in the disciplines of electrical, computer and robotic engineerings.(ratio:25.00) B. Core competency 1.2: Have the ability to plan and execute electrical and robotic engineering research studies.(ratio:30.00) C. Core competency 2.1: Have the ability to prepare professional papers in the electrical and robotic engineering field.(ratio:10.00) D. Core competency 2.2: Have the abilities to be creative thinking and to independently solve electrical and robotic engineering related problems.(ratio:15.00) E. Core competency 2.3: Have the ability to lead, manage, plan, coordinate and integrate personnel from various fields.(ratio:10.00) F. Core competency 3.1: Have advanced global awareness and the ability of lifelong self-study.(ratio:10.00) 			
Subject Schoolwide essential virtues			
<ul style="list-style-type: none"> 1. A global perspective. (ratio:10.00) 2. Information literacy. (ratio:30.00) 3. A vision for the future. (ratio:15.00) 			

4. Moral integrity. (ratio:10.00)
5. Independent thinking. (ratio:15.00)
6. A cheerful attitude and healthy lifestyle. (ratio:5.00)
7. A spirit of teamwork and dedication. (ratio:10.00)
8. A sense of aesthetic appreciation. (ratio:5.00)

Course Introduction

This course focuses on building students' hardware-software integration skills. It includes vision applications using Python on GPU platforms and hardware design with VHDL on FPGA platforms to implement tracking control applications.

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	Helping students develop key skills for embedded AI systems.	Cognitive

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

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

Course Schedule

Week	Date	Course Contents	Note

1	114/02/17 ~ 114/02/23	Course Overview	
2	114/02/24 ~ 114/03/02	Overview of FPGA technology	
3	114/03/03 ~ 114/03/09	Quartus Block Schematic Design	
4	114/03/10 ~ 114/03/16	FPGA Experiment - 4-Bit Adder	
5	114/03/17 ~ 114/03/23	FPGA VHDL Programming FPGA	
6	114/03/24 ~ 114/03/30	Experiment - 4-Bit BCD Adder	
7	114/03/31 ~ 114/04/06	FPGA Experiment-UART	
8	114/04/07 ~ 114/04/13	FPGA Experiment-UART	
9	114/04/14 ~ 114/04/20	Midterm	
10	114/04/21 ~ 114/04/27	FPGA Experiment - PID Control	
11	114/04/28 ~ 114/05/04	FPGA Experiment - Motor Control	
12	114/05/05 ~ 114/05/11	FPGA Experiment - Motor Control	
13	114/05/12 ~ 114/05/18	Overview of NVIDIA Jetson Nano	
14	114/05/19 ~ 114/05/25	Computer Vision with Jetson Nano	
15	114/05/26 ~ 114/06/01	Computer Vision with Jetson Nano	
16	114/06/02 ~ 114/06/08	Student Presentation - I	
17	114/06/09 ~ 114/06/15	Student Presentation - II	
18	114/06/16 ~ 114/06/22	Flexible Teaching Week	
Key capabilities	self-directed learning		
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)		
Distinctive teaching	Project implementation course		

Course Content	Computer programming or Computer language (students have hands-on experience in related projects) Logical Thinking AI application
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Presentations Name of teaching materials: Self-made teaching slides
References	
Grading Policy	◆ Attendance : 10.0 % ◆ Mark of Usual : 30.0 % ◆ Midterm Exam : 30.0 % ◆ Final Exam : 30.0 % ◆ 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.