

## Tamkang University Academic Year 113, 2nd Semester Course Syllabus

Course Title	NTELLIGENT MIXED-MODE INTEGRATED CIRCUIT DESIGN	Instructor	CHEN HSIN LIANG
Course Class	TETXD1A DOCTORAL PROGRAM, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, 1A	Details	◆ General Course ◆ Selective ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG4 Quality education		
D e p a r t m e n t a l   A i m   o f   E d u c a t i o n			
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			
A. Core competency 1.1: Have professional knowledge in the disciplines of electrical, computer and robotic engineerings.(ratio:30.00) B. Core competency 1.2: Have the ability to plan and execute electrical and robotic engineering research studies.(ratio:10.00) C. Core competency 2.1: Have the ability to prepare professional papers in the electrical and robotic engineering field.(ratio:20.00) D. Core competency 2.2: Have the abilities to be creative thinking and to independently solve electrical and robotic engineering related problems.(ratio:20.00) 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			
1. A global perspective. (ratio:30.00) 2. Information literacy. (ratio:30.00) 3. A vision for the future. (ratio:10.00)			

4. Moral integrity. (ratio:5.00)				
5. Independent thinking. (ratio:5.00)				
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 introduces and discusses mixed-mode circuits, such as ADCs, DACs, PLLs, and Filters. These topics will be addressed, from architectures to detailed circuit techniques. Especially, the calibration schemes for PVT variations will be discussed to improve the accuracy of these circuits. Students could learn and practice one of these topics wi/wo calibration scheme.		
<p><b>The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.</b></p> <p>Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.</p> <p>I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.</p> <p>II.Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.</p> <p>III.Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.</p>				
No.	Teaching Objectives			objective methods
1	Learn and practice the mixed-mode circuits			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, Experience	Testing, Study Assignments, Discussion(including classroom and online), Report(including oral and written)
Course Schedule				
Week	Date	Course Contents		Note

1	114/02/17 ~ 114/02/23	Introduction of the mixed-mode circuits	
2	114/02/24 ~ 114/03/02	PVT variations	
3	114/03/03 ~ 114/03/09	Noises	
4	114/03/10 ~ 114/03/16	D/A	
5	114/03/17 ~ 114/03/23	D/A	
6	114/03/24 ~ 114/03/30	NyquistRate A/D Converters	
7	114/03/31 ~ 114/04/06	NyquistRate A/D Converters	
8	114/04/07 ~ 114/04/13	Oversampling Rate A/D Converters	
9	114/04/14 ~ 114/04/20	Oversampling Rate A/D Converters	
10	114/04/21 ~ 114/04/27	Midterm	
11	114/04/28 ~ 114/05/04	PLLs	
12	114/05/05 ~ 114/05/11	PLLs	
13	114/05/12 ~ 114/05/18	Filter Theorem	
14	114/05/19 ~ 114/05/25	Continuous-Time Filters	
15	114/05/26 ~ 114/06/01	Discrete-Time Filters	
16	114/06/02 ~ 114/06/08	Report	
17	114/06/09 ~ 114/06/15	Final Term	
18	114/06/16 ~ 114/06/22	Flexible Teaching Week	
Key capabilities		self-directed learning International mobility Information Technology Problem solving	
Interdisciplinary		STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)	
Distinctive teaching		Project implementation course Special/Problem-Based(PBL) Courses	

Course Content	<p>Computer programming or Computer language (students have hands-on experience in related projects)</p> <p>Intellectual Property (learning intellectual property)</p> <p>Logical Thinking</p> <p>AI application</p>
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Handouts
References	<p>Analog Design Essentials, By Willy M. C. Sansen</p> <p>Understanding Delta-Sigma Data Converters, By R. Schreier</p> <p>Design of CMOS Phase-Locked Loops, By Behzad Razavi</p> <p>Analog Integrated Circuit Design, By David Johns</p>
Grading Policy	<p>◆ Attendance : 10.0 %    ◆ Mark of Usual : 30.0 %    ◆ Midterm Exam : 30.0 %</p> <p>◆ Final Exam : 30.0 %</p> <p>◆ Other ( ) : %</p>
Note	<p>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>.</p> <p><b>※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.</b></p>