جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Special Topics in Systems - EE 390J

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	EE 390J
Course Title	Special Topics in Systems
Academic Semester	Fall
Academic Year	2019/2020
Semester Start Date	08/25/2019
Semester End Date	12/10/2019
Class Schedule (Days & Time)	02:30 PM - 04:00 PM | Sun Thu

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Shehab Ahmed Elsayed	Shehab.Ahmed@kaust.edu.sa	+966128087823	0235, 5, Al-Kindi (bldg. 5)	Sunday and Thursday 4:00 - 5:00 PM or by appointment

Teaching Assistant(s)

Name	Email

Course Information

Comprehensive Course Description	The course aims to provide a broad understanding of the issues of relevance in the field of power electronics. Students will be able to use systematic analytical and computer modeling tools to synthesize and critically evaluate power conversion circuits.
Course Description from Program Guide	
Goals and Objectives	- Gain a broad understanding of methods to synthesize and model power converters - Gain a broad understanding of the methods of control of power converters - Develop an understanding of advanced power conversion concepts, including EMI, soft switching, and losses.
Required Knowledge	- Basic course in power electronics or instructor approval - Proficiency in the use of mathematical software such as Mathcad/Matlab/Mathematica/Maple
Reference Texts	Lecture notes and assigned research papers.
Method of evaluation	**10.00**% - Final exam **90.00**% - Homework /Assignments
Nature of the assignments	The assignments will revolve around case study projects. These will consist in design/analysis segments forming ten assignments. All assignemnts will be computer based, and will require the use of mathematical analysis tools such as Mathcad (will be used in class).
Course Policies	Nine best homework assigments will be used to determine the final grade. No late sumbissions will be accepted.
Additional Information	

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Sun 08/25/2019 Thu 08/29/2019	Power converter topology features and synthesis
2	Sun 09/01/2019 Thu 09/05/2019	State space models and converter time series simulation
3	Sun 09/08/2019 Thu 09/12/2019	Frequency domain models
4	Sun 09/15/2019 Thu 09/19/2019	Switching losses and thermal analysis
5	Sun 09/22/2019 Thu 09/26/2019	Reactive element models for power converters
6	Sun 09/29/2019 Thu 10/03/2019	Interconnect modeling and layout
7	Sun 10/06/2019 Thu 10/10/2019	Conducted EMI modeling
8	Sun 10/13/2019 Thu 10/17/2019	Phasor dynamic models and cartersian domain control
9	Sun 10/20/2019 Thu 10/24/2019	Polar domain and multiloop control
10	Sun 10/27/2019 Thu 10/31/2019	Scalar control and vector modulation
11	Sun 11/03/2019 Thu 11/07/2019	Softswitching power converters
12	Sun 11/10/2019 Thu 11/14/2019	Multilevel converters - topologies and modulation
13	Sun 11/17/2019 Thu 11/21/2019	Multilevel converters - Dynamics
14	Sun 11/24/2019 Thu 11/28/2019	Direct AC - AC converters - Matric converters topologies and modulation
15	Sun 12/01/2019 Thu 12/05/2019	Matrix converters - modeling and architectural realizations
16	Sun 12/08/2019	Exams

Note

The instructor reserves the right to make changes to this syllabus as necessary.