University of Tehran
School of Electrical and Computer Engineering

Course:	**8101602 –Stochastic Control**
Course type:	EE*: Com ☐ E ☐ P ☐ B ☐ Con ☐ D ☐ — CE*: SW ☐ HW ☐ IT ☐ — Credit: 1 Required ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Elective ☐ ☐ ☐ ☐ ☒ ☐ ☐ ☐ ☐
Level:	Undergraduate ☐ Graduate ■
Co-requisite(s):	None.
Prerequisite(s):	None.
Prerequisite by topic:	Optimal control theory, Stochastic process
Textbook(s):	[1] H. P. Geering et al., Stochastic Systems, Measurement and Control Laboratory, ETH, 2007. [2] Ramon van Handel, Stochastic Calculus, Filtering, and Stochastic Control, Lecture Notes, Princeton, 2007. [3] Jian-Qiao Sun, Stochastic Dynamics and Control, Elsevier Science, 2006. [4] Karl. J. Astrom, Introduction to Stochastic Control Theory, Academic Press, 1970.
Coordinator:	Kebriaei, Professor, School of ECE
Goals:	This is an introductory course in analysis and control of continuous time stochastic systems. Many of the dynamical systems are influenced by random uncertainties, which arise from external excitations or imperfect modeling of the system. The behavior of those systems can be described through a stochastic differential equation, where the system's variables are some stochastic processes. We see that a new calculus is needed for analysis of the stochastic dynamical systems. The convergence, stability, filtering and control of the dynamic stochastic systems are discussed in this course. In addition, some applications are studied from control, finance, biological and communication systems.
Outcome:	Upon successful completion of the course, students will be able to 1. Understand the basics stochastic systems and applications 2. Understand the concept of white noise and Brownian motion 3. Use ito lemma to solve a stochastic differential equation 4. Analyse the stability of a stochastic system 5. Design optimal control for stochastic systems
Topics:	1) Motivation 2) Introduction 3) Stochastic calculus and Stochastic Differential Equations (SDE) 4) Stochastic stability

	5) Filtering 6) Stochastic optimal control
Computer usage:	MATLAB
Assignments:	5 to 7 homework assignments
Projects:	1 to 2 projects
Grading:	Assignments and Project: 30 % Final exam: 70 %
Further readings:	None.
Prepared by:	Kebriaei, Professor, School of ECE
Date:	23 August 2017

*EE: Electrical Engineering		CE: Computer Engineering	
Com	Communications	SW	Software
E	Electronics	HW	Hardware
P	Power	IT	Information Technology
B	Bioelectronics		
Con	Control		
D	Digital System		