COURSE NUMBER: Ve460	**COURSE TITLE:** Control Systems Analysis and Design
CREDIT: 4	**PREREQUISITES:** Ve216
TEXTBOOKS/REQUIRED MATERIAL: Automatic Control Systems, 8th Edition, 2003, ISBN: 978-0-471-13476-3, by B. C. Kuo and F. Golnaraghi	**PREPARED BY:** Jun Zhang **DATE OF PREPARATION:** Oct, 2013 **DATE OF UC APPROVAL:**
INSTRUCTOR(S): Jun Zhang	**SCIENCE/DESIGN:** n/a
CATALOG DESCRIPTION: Basic techniques for analysis and design of controllers applicable in any industry (e.g. automotive, aerospace, computer, communication, chemical, bioengineering, power, etc.) are discussed. Both time- and frequency-domain methods are covered. Root locus, Nyquist and Bode plot-based techniques are outlined. Computer-based experiment and discussion sessions are included in the course.	**COURSE TOPICS:** 1. Introduction 2. Mathematical foundation 3. Block diagrams and signal flow graphs 4. Modeling of systems 5. Stability 6. Time-domain response 7. Root locus 8. Frequency-domain analysis 9. Design techniques 10. State variable analysis
COURSE STRUCTURE/SCHEDULE: Lecture: two times per week	

COURSE OBJECTIVES [Course Outcomes in brackets]	1. To teach students basic concepts of steady-state and transient analysis of linear feedback systems; [1] 2. To teach students basic concepts of robustness of linear feedback systems; [2] 3. To teach students techniques and CAD tools for designing linear feedback control systems; [3, 4, 5, 6] 4. To stimulate student interest in control applications, & to prepare them for industry & graduate study [1-6]
COURSE OUTCOMES [Program Outcomes in brackets]	After completing Ve460, students should be able to: 1. Ability to design a controller so that a feedback systems meets steady-state and transient specs; [a, c] 2. Ability to design a controller so that a feedback systems meets robustness specs; [a, c] 3. Ability to recognize feedback problems that are fundamentally difficult; 4. Ability to use root locus, Nyquist and Bode techniques to modify properties of a control system; [a] 5. Ability to identify and evaluate design tradeoffs among specs such as rise time and robustness; [a, e]] 6. Ability to use CAD tools (Matlab) for analysis and design of control systems. [a, k]
ASSESSMENT TOOLS [Course Outcomes in brackets]	Homework: 30 % (including course participation) Midterm: 30 % Final: 35 % Attendance: 5 %