

Course Number: EE 433

Course Title: Applied Control Engineering (Elective Course)

Course Description :

Introduction to distributed computer control systems and digital control issues. Introduction to process control. Feedback and feed forward control configurations. Modeling of dynamic systems: time delays, high order systems, multivariable systems. Process identification. Controller performance analysis and design. PID controller tuning. Process interaction and decoupling control.

Prerequisites :

EE 380 Control Engineering I

Textbook :

Process Dynamics and Control. Seborg D., Edgar T., Mellichamp D., Wiley, 1989.

Other Useful References and Material :

- Chemical Process Control: An Introduction To Theory and Practice, Stephanopoulos, G., Prentice Hall, 1984.
- Process Control Systems, Shinskey, F., McGraw-Hill, 1988.

Website : <http://www.kfupm.edu.sa/ee/bscourses.htm>

Course material will be also available in electronic format on WebCT

Course Objectives :

- Know the need and economic justification of process control
- Know the mathematical modeling of processes, dynamic and steady state models, transfer function models, linearization of nonlinear models, and first and second order empirical models from process data
- Know and be able to carry out design of controllers using direct synthesis method, internal model control, and PID control
- Know and be able to carry out PID controller tuning
- Know and be able to carry out feed-forward and ratio controllers
- Know how to derive empirical models from frequency response data

Topics Covered :

- Introduction to process control
- Mathematical modeling of chemical processes
- Transfer function models.
- Empirical models from step response data
- Controller design based on transient response criteria
- Controller tuning
- Feed-forward and ratio control
- Empirical models from frequency response data

Class/Laboratory Schedule :

3 lectures per week, 50 minutes each and 3 hours lab per week.

Course Outcomes :

- Acquire a working knowledge of process control
- Model chemical processes from first principles and using step response data
- Design controllers for different process applications
- Use the techniques, tools and skills related to process control, computer science and modern process control engineering in modern engineering practice
- Communicate system-related concepts effectively

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