MOLECULAR BIOSCIENCES AND BIOENGINEERING
COURSE DESCRIPTION
BE 421 – Bioprocess Control

Catalog Description:  3 Credits. Analysis of control of processes in both time and Laplace domains with an introduction to the frequency domain; selection and design of appropriate control systems for bioprocesses with consideration of the impact on the total system; Identification of safety concerns in designing control systems and process equipment.

Recommended texts and references:


Prerequisites: MATH 243, BE 360 or consent.

Schedule: Two 75-minute class sessions/laboratory per week.

Designation: Elective course.

Topics:
Control loop hardware
Dynamic modeling
Laplace Transforms and Transfer Functions
Idealized dynamic behavior
PID controls and PID controller tuning
Frequency Response Analysis
Cascade, Ratio, and Feedforward Control
Control of MIMO processes
Statistical Process Control
Applications in Biological Systems

Contribution to Meeting Professional Component:
Mathematics and Basic Sciences: Mathematical foundations underlying process dynamics and control for mathematical modeling are presented.
Engineering Topics: Students apply and integrate knowledge of process engineering to identify, formulate and solve process control problems, and apply modern computational techniques and tools to solve chemical and bioprocess control problems.

General Education: Students are required to complete homework assignments and to write reports on experimental and computational projects.

Relation to Program Outcomes:
BE 421 contributes to the following BE Program outcomes:
(a) solve problems involving differential equations;
(c) solve engineering problems involving dynamics, fluid mechanics, and thermodynamics;
(d) design a system, component, or process.
(e) design and conduct experiments to gather information for engineering designs;
(f) use modern engineering techniques, skills, and tools to define, formulate, and solve engineering problems;
(g) function effectively in multi-disciplinary teams;
(h) identify professional and ethical responsibilities when practicing engineering;
(i) communicate effectively in large and small groups
(j) understand the impact of engineering solutions on the surrounding context.

Prepared by: Patrick Fu; Date: 8/8/03.