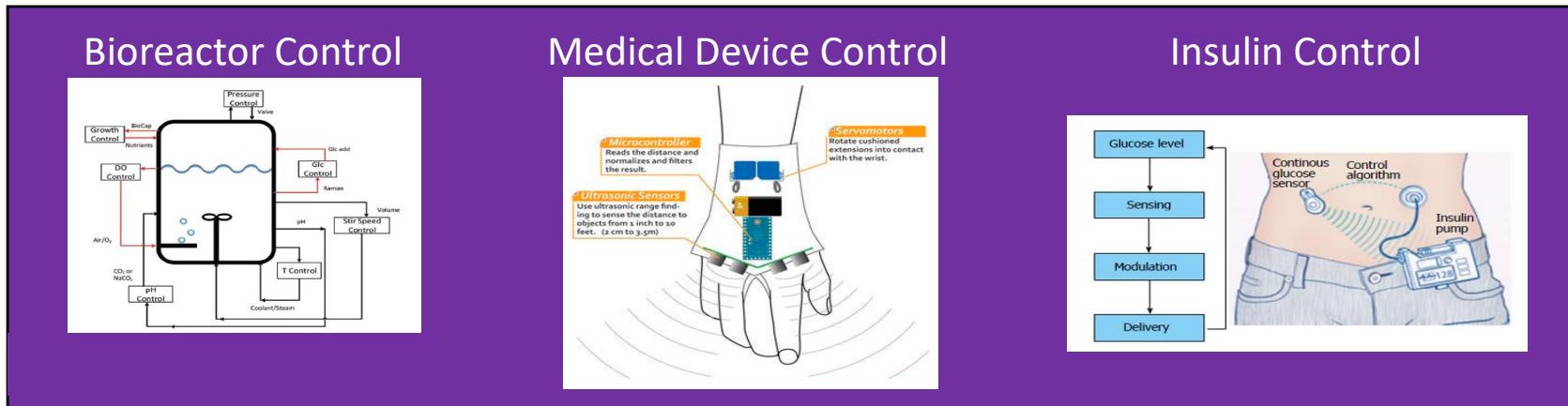


BIOEN 438/538: Biomedical Control Systems Engineering

A practical approach to creating robust biological components.

Winter, 2026.

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Closed loop design (control engineering) is essential to building robust systems from biochemical pathways and other open loop biological components that: regulate outputs to a setpoint; ensure stability; and minimize oscillations. This course teaches the essentials of closed loop design using mechanistic models of biochemical systems. Students will acquire the following skills:

- determine appropriate control objectives for a closed loop system;
- characterize the time domain behavior of a biological system;
- develop closed loop architectures that make use of PID controllers, filters, and techniques for compensating biochemical systems;
- computational techniques for finding designs that satisfy control objectives.

Students should have prior experience with programming in python (e.g., BIOEN 336, 437/537).