# St.Louis Washington University in St.Louis

# The Minor in Mechatronics

Advancements in power electronics, electronic sensors, and computer hardware and software have led to an expanding role for "smart" systems, which combine electronic and mechanical components. Automotive examples illustrate this point. The replacement of carburetors by fuel injection systems is almost universal, and hybrid/ electric cars are replacing traditional automobiles. Not only are auxiliary devices such as fuel pumps, air bags and air-conditioner compressors driven by electric motors controlled by microprocessors, but fundamental components such as intake and outtake valves soon will be driven in this way. The internal combustion engine itself may be replaced by fuel cells and motors. Medical devices, microelectromechanical systems, robots, fly-by-wire aircraft and wind turbines also all rely on electronic sensing of mechanical parameters and actuation of motion. These examples suggest strongly that engineers who are adept in the design, analysis and simulation of electromechanical systems will be in demand. The minor in mechatronics is created to encourage our students to study this important subject and provide recognition to those who do so.

This program is primarily designed for students in the ESE and MEMS departments and has been approved by the two departments. It is available for others as well.

The proposed minor program consists of four required courses, two electives and one prerequisite:

## Four required courses:

| Code        | Title   | Units |
|-------------|---|-------|
| ESE 444     | Sensors and Actuators   | 3     |
| ESE 446     | Robotics: Dynamics and Control                                  | 3     |
| MEMS 255    | Dynamics  | 3     |
| MEMS 411    | Mechanical Engineering Design Project<br>(mechatronics project) | 3     |
| Total Units |   | 12    |

### Two electives chosen from the following:

| Code       | Title                            | Units |
|------------|----------------------------------|-------|
| ESE 436    | Semiconductor Devices            | 3     |
| ESE 482    | Digital Signal Processing        | 3     |
| MEMS 4301  | Modeling, Simulation and Control | 3     |
| or ESE 441 | Control Systems                  |       |
| MEMS 4310  | Vibrations                       | 3     |

### **Prerequisite:**

| Code    | Title                                   | Units |
|---------|---|-------|
| CSE 131 | Introduction to Computer Science (basic | 3     |
|         | programming course)                     |       |

For more information about the minor, contact Dennis Mell (https:// engineering.wustl.edu/faculty/Dennis-Mell.html) (ESE) or Jackson Potter (https://engineering.wustl.edu/faculty/Jackson-Potter.html) (MEMS).