Joint Engineering Mechatronics (JEM)

JEM 123 Introduction to Computer Aided Design for Mechatronics Engineering (1 credit hours)
This course presents the basic concepts of Computer Aided Design (CAD) for Mechatronics Engineering. Solidworks is used as the design tool. Students learn solid modeling of parts and assemblies, along with generation of engineering drawings. This includes standard practices for dimensioning and tolerances. Offered at UNC Asheville only.

Prerequisite: E 101
Typically offered in Spring only

JEM 180 Mechatronics Laboratory I (2 credit hours)
This course is a hands-on introduction to Mechatronic systems. Mechatronics systems involve electronic circuitry, mechanical components, and computers or microcontrollers. In this first of 3 lab courses, students are exposed to the use of basic circuit components, design and fabrication of mechanical components using CAD, and simple programming techniques. Construction of various Mechatronics systems demonstrate how sensors, actuators and control logic can be combined to accomplish complex tasks. Offered at UNC Asheville only.

Corequisite: JEM 123
Typically offered in Spring only

JEM 270 Mechatronics Laboratory II (2 credit hours)
This course is the second of three hands-on lab courses enabling students to design and construct various Mechatronics systems. Various industry standard sensors and actuators are introduced. Layout and fabrication of simple circuit boards is practiced, along with basic circuit simulation. CAD skills are broadened to explore mechanism motion and animation. Finite Element Analysis is introduced for static stress analysis.

Prerequisite: JEM 180
Typically offered in Spring only

JEM 320 Mechatronics Systems Modeling (3 credit hours)
This course is devoted to the development of mathematical models of mechatronics engineering systems. The course will introduce the fundamental concepts of analytical modeling, numerical modeling, Laplace transforms, computer simulation, digital systems, and control theory. For Mechatronics students only; Offered at UNC Asheville only.

Prerequisite: C- or better in ECE 220
Typically offered in Fall only

JEM 355 Robotics and Autonomous Systems (3 credit hours)
Control techniques for robotics and autonomous systems. In this project-based course, students will demonstrate robotic control capabilities through programming physical and virtual robots. Key methodologies include advanced robot control, robot coordination, sensing, state estimation, motion planning, and robotic kinematics. Applications in specific robotic areas including industrial robots and wheeled robots.

Prerequisite: C- or better in ECE 220; Corequisite: JEM 360
Typically offered in Spring only

JEM 360 Mechatronics Laboratory III (2 credit hours)
This course is the third hands-on Mechatronics lab course. As in prior courses, the goal is to have students design and construct a variety of Mechatronic systems. Topics include programming and simulation of industrial robots, an introduction to Computer Numerical Control (CNC) machining, and the use of Programmable Logic Controllers in industry. Finite element capabilities are expanded to include simple heat transfer simulations, along with generative design of mechanical components.

Prerequisite: JEM 270 and ECE 306 and C- of better in ECE 211 and ECE 220 and MAE 214
Typically offered in Spring only

JEM 484 Senior Design Project in Mechatronics Engineering I (3 credit hours)
The first laboratory course in the sequence of a two-semester capstone senior design project. Students will be exposed to the fundamentals of engineering a mechatronics project with emphasis on conceptual formulation, design principles, fabrication, testing and verification, project management, and communication skills within a team environment. JEM 484 and JEM 485 must be completed in the same academic year. For mechatronics students only; Offered at UNC Asheville only.

Prerequisite: JEM 320 and JEM 355 and JEM 360 and C- or better in MAE 208
Typically offered in Fall only

JEM 485 Senior Design Project in Mechatronics Engineering II (3 credit hours)
In this laboratory course, students will develop and refine oral, written and graphical communication skills as their senior design project is finalized, presented and demonstrated. The course is conducted in a team environment. For mechatronics students only; offered at UNC Asheville only.

Prerequisite: JEM 484
Typically offered in Spring only