Mechatronics

Program Description
Mechatronics is the blending of electronics, mechanics, electrical. and computers to produce a well-rounded technician capable of handling the complex maintenance and operations tasks demanded by modern manufacturing, transportation, communication, and other industries. The modularization of electro-mechanical devices no longer requires in-depth specialization of a single field of study as more emphasis is placed on troubleshooting and replacement skills for maintenance and generalized knowledge of how systems work together for operations and purchasing and planning.

Certificate of Achievement and Associate in Science Degree
A Certificate of Achievement can be obtained upon completion of the 42-unit major listed below. The Associate in Science Degree can be obtained by completing a total of 60 units, including the 42 unit major, the general education requirements, and electives. All courses in the major must be completed with a grade of C or better or a P if the course is taken on a Pass/No Pass basis.

Program Outcomes
Students who complete the Mechatronics Certificate of Achievement/Associate Degree will be able to:

1. Safely operate a variety of testing instruments and diagnostic tools.
2. Recognize complex systems and understand their function, operation, advantages and disadvantages.
3. Analyze complex systems and diagnose/troubleshoot problems.

REQUIRED COURSES . . . . . Units
CIS 001 Introduction to Computer Science. 3
IT 050 Alternative Energy Technologies 3
IT 101 How Things Work 3
IT 151 Vocational Mathematics. 3
MT 120 Principles of Analog Electronics 3
MT 122 Principles of Digital Electronics 3
MT 130 Principles of Mechanical Power Systems 3
MT 132 Principles of Fluid Power Systems 3
MT 140 Principles of Industrial Electrical Systems 3
MT 142 Principles of Electrical Machinery 3
MT 162 Robotic Manufacturing Systems 3
MT 164 Programmable Logic Controllers. 3
Electives Selected from List A. 6
Total Units 42

List A (select 6 units)
ACR 100 Air Conditioning and Refrigeration 3
OR
ACR 101 Air Conditioning and Refrigeration 3
DRFT 045 Introduction to Computer-Aided Drafting (CAD) 3
DRFT 050 Basic Drafting 3
DRFT 079 Blueprint Reading. 3
IT 110 Modern Welding 3
IT 120 Electrical Safety 3
IT 140 Industrial Materials. 3
OCED 070 Occupational Soft Skills 3
OCED 090 Occupational Work Experience . . . . . 1 - 6

This is a Gainful Employment Program. For additional information, please visit ***http://www.solano.edu/gainful_employment/*** and select "Mechatronics."

Industrial Education

Air Conditioning & Refrigeration

ACR 100 3.0 Units
Air Conditioning and Refrigeration
Course Advisory: SCC minimum English standard. A study of compression systems, controls, refrigerants, various refrigeration systems, and commercial applications designed to develop the ability to understand and apply the basic principles required to maintain and service this type of specialized equipment. *Three hours lecture.*

ACR 101 3.0 Units
Air Conditioning and Refrigeration
Course Advisory: ACR 100; SCC minimum English standard. The maintenance and servicing of commercial air conditioning and refrigeration systems with the study of techniques applied to refrigerant handling, systems controls, and compression systems. *Three hours lecture.*

Industrial Management

IT 050 3.0 Units
Alternative Energy Technologies
Course Advisory: SCC minimum English and Math standards. Introduces the topics of power generation, transmission, and consumption of both conventional and alternative energy sources. Students will be exposed to an in-depth analysis of the design and use of fossil fuel based systems and then compare those systems to alternatives. Energy use in transportation, industrial, commercial, and residential applications will be examined. *Three hours lecture.*

IT 101 3.0 Units
How Things Work
Course Advisory: SCC minimum English and Math standards. Provides an understanding of how the technology in our lives works using only basic concepts and rudimentary mathematics. This course considers objects from our daily environment and focuses on their principles of operation, histories, and relationships to one another. Students learn about common technologies through lecture, classroom discussion, and laboratory experiments. *Two hours lecture, three hours lab.*

IT 110 3.0 Units
Modern Welding
Course Advisory: SCC minimum English standard. Designed to acquaint the student with the fields of arc and acetylene welding, the tools and equipment used, shop safety and employment opportunities. *Two hours lecture, three hours lab.*

IT 111 3.0 Units
Modern Welding
Prerequisite: IT 110. Designed to acquaint the student with MIG and TIG welding methods and knowledge necessary to weld in all positions utilizing the mild steel, low hydrogen electrodes, metal inert gas and tungsten inert gas techniques. *Two hours lecture, three hours lab.*

IT 120 1.0 to 3.0 Units
Electrical Safety
Course Advisory: SCC minimum English and Math starndards. A survey of the proper use, handling, and hazards associated with electrical and electronic equipment. The student will be introduced to the current generally accepted (National Electrical Safety Code) safety practices and procedures associated with power transmission, industrial, and consumer electrical and electronic equipment. This is an Open Entry/Open Exit course. Formerly ECTN 102. Students may take this course up to the maximum number of units over multiple semesters. *One to three hours lecture.*

IT 130 1.0 Unit
Fundamentals of Wire Cabling
Course Advisory: SCC minimum English and Math standards. Presents the principles and practices of copper cable wiring technology. Includes instruction in the design, installation, and maintenance of copper wiring systems for intelligent control systems, lighting and appliance control devices, communication, and networking. Also includes instruction in household and institutional power wiring. Formerly ECTN 111. *One hour lecture, one hour lab.*

IT 132 1.0 Unit
Fundamentals of Fiber Optics
Course Advisory: SCC minimum English and Math standards. Presents the principles and practices of fiber optics and optoelectronic technology. Includes instruction in the design, installation, and maintenance of fiber optic cabling and control systems and optoelectronic control systems for computer communication and networking systems. Formerly ECTN 112. *One hour lecture, one hour lab.*

IT 134 1.0 Unit
Fundamentals of Wireless Communication
Course Advisory: SCC minimum English and Math standards. Presents the principles and practices of wireless communication technology. Includes instruction in the design, installation, and maintenance of wireless communication and network systems. Emphasis is placed on system reliability, security, and cost containment concerns. Formerly ECTN 113. *One hour lecture, one hour lab.*

IT 140 3.0 Units
Industrial Material
Course Advisory: SCC minimum English standard. A broad overview of the characteristics and comparative qualities of naturally occurring, alloyed and man-made materials used in industry. Testing and practical use of materials are required. *Two hours lecture, three hours lab.*

IT 151 3.0 Units
Vocational Mathematics
Course Advisory: SCC minimum English and Math standards. Focuses on mathematical functions, plane and solid geometry, measurement systems, algebra, and trigonometry applied to specific vocational areas. *Three hours lecture.*

Maintenance Technician

MT 120 3.0 Units
Principles of Analog Electronics
Course Advisory: SCC minimum English and Math standards. Introduces the topic of analog electronics as it applies to mechatronics. Studies include an introduction to DC and AC circuitry as well as advanced electronic components, instruments used in the operation, installation, and troubleshooting of electronic systems, schematic diagrams, and breadboarding. Students will construct several kits as part of the class. *Two hours lecture, three hours lab.*

MT 122 3.0 Units
Principles of Digital Electronics
Course Advisory: SCC minimum English and Math standards. Introduces the topic of digital electronics as it applies to mechatronics. Studies include an introduction to digital numbering systems, digital codes and logic, registers, memories, Boolean Algebra, and integrated circuits as well as advanced topics in computerized control systems. Students will construct several kits as part of the class. *Two hours lecture, three hours lab.*

MT 130 3.0 Units
Principles of Mechanical Power Systems
Course Advisory: SCC minimum English and Math standards. Introduces the topic of mechanical power systems and mechanical power transmission as it applies to mechatronics. Studies include mechanical theory, mechanical power, thermal systems, hand tools, precision measuring instruments, and mathematics applied to mechanical power systems. Includes studies in manufacturing technology using modern manufacturing equipment and software simulators. *Two hours lecture, three hours lab.*

MT 132 3.0 Units
Principles of Fluid Power Systems
Course Advisory: SCC minimum English and Math standards. Introduces the topic of hydraulic and pneumatic systems as they apply to mechatronics. Studies include fluid power systems theory, pumps, actuators, accumulators, filters, meters, valves, control devices, and mathematics applied to fluid power systems. Includes studies in manufacturing technology using modern manufacturing equipment and software simulators. *Two hours lecture, three hours lab.*

MT 140 3.0 Units
Principles of Industrial Electrical Systems
Course Advisory: SCC minimum English and Math standards. Introduces the topic of DC, single-phase and three-phase AC circuits as they apply to mechatonics. Introduces commercial/industrial electrical installations that meet National Electrical Code requirements. Students will complete labs and wiring projects. Lab, electrical and worksite safety is emphasized. *Two hours lecture, three hours lab.*

MT 142 3.0 Units
Principles of Electrical Machinery
Prerequisite: A minimum grade of C in MT 120, or MT 140. Course Advisory: SCC minimum English and Math standards. Introduces the topic of electrical machinery as it applies to mechatronics. Studies include direct-current and alternating-current generators, alternators, transmission equipment, and motors. Students will complete labs and electrical machinery projects. Lab, electrical and worksite safety is emphasized. *Two hours lecture, three hours activity.*

MT 162 3.0 Units
Robotic Manufacturing Systems
Course Advisory: SCC minimum English and Math standards. Presentation of physical principles applied to automated manufacturing systems. Students will develop solutions to manufacturing problems using robots, programmable logic controllers (PLC) and computer numerical control (CNC) manufacturing machines. Students will also apply safety-oriented work habits to the completion of laboratory projects while working individually and in groups. *Two hours lecture, three hours lab.*

MT 164 3.0 Units
Programmable Logic Controllers
Course Advisory: SCC minimum English and Math standards. Introduces the student to process control via Programmable Logic Controllers (PLC's). Content includes the popular Allen-Bradley PLC systems and the most common command instructions for the RSLogix 5, RSLogix 500, RSLogix 5000, Micrologix 1000, SLC5 and SLC 500 as well as ControlLogix processors. Troubleshooting and electrical safety are emphasized. *Two hours lecture, three hours lab.*