

MECHATRONICS AND ADVANCED MANUFACTURING TECHNOLOGY

Mechatronics is a multidisciplinary field of science that includes a combination of mechanical engineering, electronics, computer engineering, telecommunications engineering, systems engineering and control engineering.

Who Studies Mechatronics and Advanced Manufacturing Technology?

The types of students likely to be successful in this field of study include:

- High school graduates
- Undergraduate students and graduates seeking competitive and marketable skills as technicians in the fields of Biotechnology, Distribution, Transportation & Logistics, Energy, Mining, Forestry, Autonomous Vehicles, Aerospace, National Security and Defense, etc.
- Trades Red Seal graduates who want to enhance their skillset.
- Trades students seeking an alternative to an apprenticeship and Red Seal certification.
- Students in theoretical programs such as physics, mechatronics, engineering, or other fields where a grounding in applied practice is an advantage.
- Individuals interested in skilled trades or the Siemens Mechatronic Systems Certification.
- Individuals transitioning into advanced manufacturing and mechatronics from other sectors.
- Mature, working professionals interested in career-enhancing studies.
- International students seeking to augment their credentials with Canadian-based curriculum and a globally recognized certification - Siemens Mechatronic Systems Certification.
- Science and Engineering students who want to augment their expertise with mechanical, process, and electrical experience.
- Design students who are seeking a means to create and produce the items they design.
- Technology students who are seeking to extend their computer-based expertise (e.g. CADD) into practical and applied realms.

Career Opportunities

Graduates of the Mechatronics and Advanced Manufacturing Technology program will be employable across a wide range of industries such as manufacturing, green technology, biotechnology, energy, transportation, telecommunications, autonomous vehicles, medical technology, building technology, agriculture, aerospace and national security and defense. Examples of job categories include:

- Controls Technologist
- Customer Service Technician
- Electrical Maintenance Technician
- Electro-Mechanical Technician
- Facilities Operators Field Service Technician
- Industrial Engineering Technician
- Maintenance Technician

- Manufacturing Process Technician
- Material Engineers Mechatronics
- Technologist Mine Engineering Technician
- Plant Engineering Systems Technician
- Production Operators Service and Installation Technician

The Mechatronics and Advanced Manufacturing Technology program also provides skills and theoretical training to meet the occupational duties and requirements as described in the following National Occupational Classifications (NOC):

- NOC 2241 Electrical and Electronics Engineering Technologists and Technicians
- NOC 7311 Construction Millwrights and Industrial Mechanics
- NOC 2243 Industrial Instrument Technicians and Mechanics
- NOC 7242 Industrial Electricians .

Note that some of the above occupations may require work experience and additional training beyond an undergraduate diploma.

Programs

- Diploma in Mechatronics and Advanced Manufacturing Technology (<https://calendar.kpu.ca/programs-az/trades-technology/mechatronics-advanced-manufacturing-technology/mechatronics-advanced-manufacturing-technology-diploma/>)

Courses

Visit the BC Transfer Guide - [bctransferguide.ca](https://www.bctransferguide.ca) (<https://www.bctransferguide.ca/>) - for information about course transfer in B.C.

MAMT 1100 4 credits

Electrical Components

Students will describe the functions and physical properties of electrical components and their roles in a mechatronic system. They will apply troubleshooting techniques and strategies to analyze and repair a faulty system. Students will create technical documentation to report abnormalities and the process used to return the system to normal. They will be introduced to current occupational safety regulations and apply safe work practices.

Level: UG

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1110 3 credits

Mechanical Components and Electrical Drives

Students will describe the functions and physical properties of mechanical components and electrical drives and their roles in a mechatronic system. They will compare the properties of, and the relationship between, alternating current (AC) and direct current (DC) in electrical drives. Students will apply mechanical principles and analyze material and lubrication selections to increase efficiency in a mechanical system. They will apply troubleshooting techniques and strategies to analyze and repair a faulty system and produce relevant documentation. Students may be required to participate in field trips.

Level: UG

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1120 4 credits

Electro-pneumatic and Hydraulic Control Circuits

Students will describe the functions and physical properties of pneumatic, electro-pneumatic and hydraulic control circuits and their roles in a mechatronic system. They will calculate volumes, determine effective operating conditions and apply safe operating parameters of pneumatic and hydraulic components. Students will apply troubleshooting techniques to identify and correct malfunctions. They will create technical documentation to report abnormalities and the process used to return the system to normal.

Level: UG

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1130 4 credits

Digital Fundamentals and Programmable Logic Controllers (PLC)

Students will describe the role of programmable logic controllers (PLCs) and trace the flow of information in a mechatronic system. They will apply the fundamentals of digital logic to write basic programs for PLCs and test these programs. Students will apply troubleshooting strategies to localize problems caused by malfunctioning PLC hardware and produce relevant documentation. They will complete a project to digitally control a mechatronic system.

Level: UG

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1200 2 credits

Process Control Technologies

Students will apply the principles of closed-loop control in a mechatronic system. They will create charts for time-based changes of process variables and establish controller operating parameters. Students will describe On/Off and Proportional/Integral/Derivative (PID) controllers and optimize the performance of each. They will apply troubleshooting techniques to analyze, repair and document a faulty system.

Level: UG

Prerequisite(s): MAMT 1130
Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1211 2 credits

Integrated Automation

Students will utilize integrated automation software and write programs incorporating a variety of functions of Programmable Logic Controllers (PLC) to control equipment operation. They will connect sensors to PLC analogue modules and set up communication networks used in automation. Students will apply troubleshooting techniques to re-establish a faulty network.

Level: UG

Prerequisite(s): MAMT 1130
Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1212 4 credits

Automation Systems

Students will apply programming techniques to operate microcontrollers and microprocessors in a mechatronic system. They will use Computer Aided Design (CAD) software to create three-dimensional models and Computer Aided Manufacturing (CAM) software to create programs for Computer Numerical Control (CNC) equipment. Students may be required to participate in field trips.

Level: UG

Prerequisite(s): MAMT 1130

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1221 2 credits

Motor Control

Students will apply the principles of control circuits to connect and operate electric motors. They will employ speed control, motor loading and braking methods to optimize the performance of a mechatronic system. Students will analyze performance data to determine causes of motor failure and apply preventive strategies to protect electric motors.

Level: UG

Prerequisite(s): MAMT 1100, 1110

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1222 3 credits

Mechanical Systems

Students will apply the principles of statics and kinetics to explore the operation of mechanical systems. They will perform calculations to determine force, stress, motion and wear of mechanical components. Students will apply troubleshooting techniques to analyze and repair a faulty mechanical system and produce relevant documentation.

Level: UG

Prerequisite(s): MAMT 1110

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1230 2 credits

Manufacturing Processes

Students will carry out the duties of assigned roles in a factory simulation. They will analyze factory performance results, recommend improvements, reflect on their process and revise until the optimized design is achieved. Students will work in teams to design a factory that will meet the requirements of a client's need for a particular product. They will give presentations on the outcomes of the project and their learning process throughout.

Level: UG

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1300 4 credits

Manufacturing Trends and Technology

Students will describe the history and evolution of manufacturing and explore how the principles of lean manufacturing create efficient systems. They will describe types of manufacturing, categorize types of equipment and identify the issues related to raw material procurement. Students will describe the environmental impact of manufacturing and describe the cradle-to-grave life cycle of products. They will compare the types of packaging used to deliver products, storage issues and the challenges of different types of transportation for manufactured products in a global system. Students may be required to participate in field trips.

Level: UG

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

MAMT 1400 4 credits

Professional Skills and Work Practicum

Students will participate in a work placement practicum in a manufacturing environment. They will apply office procedures and software to perform professionally in the manufacturing industry. Students will apply time management procedures to work efficiently and employ stress management strategies to help maintain a healthy work/life balance. They will create a resume and an online portfolio of their training and give presentations to share their experiences in the manufacturing sector. Students may be required to participate in field trips.

Level: UG

Prerequisite(s): All of (a) MAMT 1120, 1200 and 1230, (b) MAMT 1210 or both MAMT 1211 and 1212, and (c) MAMT 1220 or both MAMT 1221 and 1222.

Attributes: F2A5 (<https://calendar.kpu.ca/courses-az/#courseattributestext>), TRAD (<https://calendar.kpu.ca/courses-az/#courseattributestext>)