

**Western University
Faculty of Engineering
Mechatronic Systems Engineering Program**

MSE 2200Q – Engineering Shop Safety Training

Course Outline Fall 2025

COURSE DESCRIPTION: This course serves to ensure that all students in the Mechatronic Systems Engineering program understand how to work safely in a shop environment. Students will have the opportunity to gain hands-on experience with basic shop machinery and will develop basic proficiency with SolidWorks computer-aided design software.

ACADEMIC CALENDAR:

https://westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_027023_1&SelectedCalendar=Live&ArchiveID=

This course will provide Mechatronic Systems Engineering undergraduate students with uniform training in the safe use of Engineering student shops.

PREREQUISITES: Entry into Year 2 of Mechatronic Systems Engineering program. Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record.

ANTIREQUISITES: MME 2200Q/R/S/T

CEAB ACADEMIC UNITS: Engineering Science 100%

CONTACT HOURS:

LECTURE: Three 2-hour sessions

LAB: One 3-hour session (stationary power tools)
Two 3-hour sessions (prototype testing and iteration, AMT demo and prototype evaluation)

RECOMMENDED/REQUIRED TEXT: None

RECOMMENDED/ REQUIRED SOFTWARE: SolidWorks. Available in the Faculty of Engineering general purpose computing labs; however, it is recommended that students install the package on their own computer. <https://www.eng.uwo.ca/itg/software/AppsAnywhere.html>

3D Printer Slicer software (Orca, Cura, or Prusa) will be used for group prototyping assignments. Students can retrieve and install the chosen software from appropriate publicly available websites.

RECOMMENDED RESOURCES/REFERENCES: Online materials. See course site on OWL.

GENERAL LEARNING OBJECTIVES (CEAB GRADUATE ATTRIBUTES)

Knowledge Base		Engineering Tools	D	Impact on Society	
Problem Analysis		Individual & Teamwork		Ethics and Equity	
Investigation		Communication		Economics and Project Mgmt.	
Design		Professionalism		Life-Long Learning	D

Notation: x represents the content level code as defined by the CEAB. blank = not applicable; I = introduced (introductory); D = developed (intermediate) and A = applied (advanced).

Rating: I – The instructor will introduce the topic at the level required. It is not necessary for the student to have seen the material before. D – There may be a reminder or review, but the student is expected to have seen and been tested on the material before taking the course. A – It is expected that the student can apply the knowledge without prompting (e. g. no review).

COURSE MATERIALS: Weekly content and guides for the laboratories will be available on the course OWL site. The material for this course will be taught in both lectures and labs; therefore, it is imperative that you attend each lecture and lab.

UNITS: SI

COURSE TOPICS AND SPECIFIC LEARNING OUTCOMES: The course is structured in three main parts: 1) an introduction to wood and metal shop safety, 2) advanced machine tool training, and 3) developing proficiency with SolidWorks. The following table summarizes the course learning outcomes along with CEAB graduate attribute indicators (GAIs) where the GAIs in bold indicate ones to be measured and reported annually.

Course Topics and Specific Learning Outcomes	CEAB Graduate Attribute Indicators
1. Emergency Procedures (Level 1 Theory Training) At the end of this section, students will be able to: a. Recall emergency procedures appropriate for personal injury in a shop setting. b. Recall emergency procedures appropriate for fire in a shop setting.	KB3
2. Safety Hazards (Level 1 Theory Training) At the end of this section, students will be able to: a. Identify general safety hazards present in a machine shop environment: electrical, pinching, entanglement, cutting and burning.	KB3
3. Wood and Metal Shop Hands-on (Level 2 Theory and Practical Training) At the end of this section, students will be able to: a. Understand and apply the major considerations when cutting or working with different materials: i. Tool sharpness and tools for different materials	KB3

ii. Cutting force and workpiece fixturing iii. Temperature and its effect on the cutting tool and workpiece iv. Cutting speed and its effect on the cutting tool and workpiece b. Demonstrate the safe operation of hand tools and stationary power equipment such as bandsaws, grinders, sanders and drill presses.	
4. Advanced Machine Tools (Theory and Practical Training) At the end of this section, students will be able to: a. Understand the importance of cleanliness in the shops and the effects of fine particulate on machine tool fits, life and work quality. b. Understand the components of a mill and lathe c. Understand the importance of mill setup and the flexibility of a knee-type mill. d. Understand the basic theory behind the operation of mills and lathes: i. Different chip types of various materials—discontinuous and continuous and the associated dangers ii. Cutting tool forms iii. Tool holding iv. Workpiece fixturing and different fixture tools available v. Clamping basics vi. Indicating vii. Workpiece locating—setting datums viii. Speeds and feeds e. Use a “Machine Tool Process Sheet” f. Observe a demonstration of milling machine and lathe use. g. Perform simple operations on a knee mill.	KB3
5. CNC Prototyping Processes (Theory and Practical Training) At the end of this section, students will be able to: a. Understand the purpose of CAM and slicing software b. Understand basic G-code commands c. Understand process specific considerations necessary for successful prototyping with each of 3D Printing, Laser Cutting, and Machining. d. Demonstrate proficiency in prototyping one or more parts in a given process to fit in an existing assembly.	KB3
6. CAD Software: 3D Modelling At the end of this section, students will be able to: a. Competently use SolidWorks for CAD modelling of components and assemblies. b. Demonstrate proficiency by successfully passing the CSWA exam.	ET2, ET3, LL2

EVALUATION: This is a participation-based course with a resultant final grade of PASS/FAIL. The evaluation criteria and grading scales vary depending on the course component deliverable:

Lectures: Attendance at each lecture is mandatory and will be recorded.

Quizzes: Delivered through the OWL. Quizzes are scored to determine whether a student has sufficiently absorbed the corresponding learning module material. The minimum passing score for each quiz can vary between 80–100% correct answers. Students must pass all quizzes to pass the course. Passing a given set of quizzes in a prerequisite module is required before a student is allowed to progress to a subsequent module.

Laboratories: Labs consist of hands-on work with stationary power tools and milling machine tools to demonstrate safe operation of those tools to cut features into various types of material. Attendance at all assigned laboratory sessions is mandatory to pass the course. Students must come prepared with a printed copy of the lab manual to use as reference during the lab exercise. All pre-lab calculations and preparation must be complete prior to entry to the session. A student may be denied entry to the session if they arrive unprepared.

Assignments: Three SolidWorks proficiency preparation assignments will be provided to encourage preparation for the CSWA exam. The CAD files resulting from online training lessons will be submitted via OWL. One Prototyping Processes group assignment will be provided so that students can gain experience designing parts for 3D printing and laser cutting processes. Groups of 4 students will be created with the group membership listing posted on the course OWL site.

CSWA Exam: The CSWA exam is administered online, directly from the SolidWorks training site. The exam will take place on Tuesday, October 28 from 6:30–9:30 pm. Preparation for the exam is entirely self-directed learning on the part of the student. Links to official training materials and sample exam questions are provided on OWL.

Name	No. of Instances	Dates	CEAB GAs ASSESSED
Lecture Attendance	3	Sept. 9, Sept. 16, Oct. 21	
Quizzes	5	Following theory modules on OWL, before hands-on training in labs	
Shops Skills Laboratories	3	Sept. 10–16 (IWMSS) Oct. 1–7 (Prototype Test and Iteration) Oct. 14–17 (AMT Demo and Prototype Evaluation)	
Prototyping Assignments	1	Sept. 24 (original design), Oct. 8 (revised design)	
SolidWorks Assignments	3	Sept. 29, Oct. 6, Oct. 14	
CSWA Exam	1	Oct. 28	ET3, LL2

Note that the dates listed above are **tentative** and may be adjusted if needed.

COURSE POLICIES: The following course-specific policies will be enforced throughout the course:

Lectures:

- Attendance at all lectures is mandatory as safety material is covered.
- Students who miss a lecture are required to contact Dr. Jacques to arrange for an alternate means of obtaining the material covered in the lecture. Failure to do so will result in the lecture portion of the course being incomplete.

Laboratory Sessions:

- Attendance at all scheduled laboratory sessions is mandatory.
- Safety material is covered in the lab session. Students who arrive late will be denied entry to the lab, resulting in a missed session.
- Students who miss the lab without a legitimate reason will receive a mark of zero for that lab.
- Students who miss a lab with academic consideration are required to reschedule the lab by contacting Dr. Jacques. Failure to do so will result in a mark of zero for that lab.
- Failure to complete all assigned lab sessions will result in failure of the course.

CSWA Exam:

- If a student misses the CSWA exam, the student must follow the *Instructions for Students Unable to Write Tests* and **provide supporting documentation** to Undergraduate Services within 24 hours of the missed test.
- If no reasonable justification for missing the CSWA exam is provided, then the student will receive a mark of zero for that component.

To pass the course, a passing grade on the CSWA exam must be obtained, all lectures must be attended, and all laboratories must be completed.

Prior Learning and Exemptions: Students who have completed the Introduction to Wood and Metal Shop Training theory, will be required to retake all quizzes, as yearly refresher training is required by law. Students who have completed any lab session and/or advanced lectures may be eligible for exemption with prior written consent from the practical skills instructor (Dr. Jacques djacque4@uwo.ca). Do not make an assumption that you are exempt as you will not be able to make up any missed lab sessions for misinterpreting whether you qualify for an exemption. Contact the instructor within the first week of the course to inquire about exemptions. Students who hold a CSWA certificate from an exam that was proctored at Western will not need to complete this part of the course; all others will be required to repeat the exam.

LATE SUBMISSION POLICY: This course employs flexible deadlines for assignments. The assignment deadlines can be found above in the course outline. For each assignment, students are expected to submit the assignment by the deadline listed. Should illness or extenuating circumstances arise, students are permitted to submit their assignment up to 48 hours past the deadline without academic penalty. **As flexible deadlines are used in this course, requests for academic consideration will not be granted.** If you have a long-term academic consideration or an accommodation for disability that allows greater flexibility than provided here, please reach out to your instructor at least one week prior to the posted deadline.

ATTENDANCE: Attendance is mandatory for all lectures and laboratories.

FACULTY OF ENGINEERING POLICIES:

Students must familiarize themselves with the policies of the Faculty of Engineering <https://www.eng.uwo.ca/electrical/pdf/2025-UG-Policy-and-Procedures.pdf>