

## MEng in Mechatronics Design Program & Registration Guidelines

Welcome to the Master of Engineering Program in Mechatronics Design! Below you will find an overview of your program requirements and important information about registering for your core and elective courses. For any questions or concerns about your program or registration, please email [students@mech.ubc.ca](mailto:students@mech.ubc.ca).

### Program Overview:

The MEng in Mechatronics Design is an intensive program with a heavy course load that includes strong laboratory components requiring significant teaching and instrumentation resources. Students admitted to the program have a high academic standing and background in mechatronics-related subjects.

The program is designed to be completed within 12 months (September to August) by taking 24 credits of coursework over two winter terms plus a 6-credit project course in the summer term.

### Course requirements:

Students must complete a total of 30 credits. Below is an overview of the typical 12-month course schedule. Note that all core courses are only offered once per year, so it is not possible to take them in a different term than what is listed below. However, if a student wishes to move a technical elective (T.ELEC) from term 1 to term 2, that is permitted.

Registration for graduate students typically opens in June of each year ([registration dates](#)). All students are expected to register for both their term 1 and 2 courses as soon as possible to maintain their spots in the program.

Term 1 (Sept-Dec)		Term 2 (Jan-Apr)		Summer (May-Aug)	
MECH 524	4	MECH 525	4	MECH 526 or 527	6
T.ELEC	3	MECH 509	4		
T.ELEC	3	T.ELEC	3		
T.ELEC	3				
	<b>13</b>		<b>11</b>		<b>6</b>

## Program Requirements:

When choosing courses, students should keep in mind the following general MEng requirements:

- At least 24 credits must be at the 500-level.
- A minimum of 18 of the 24 credits must be in the program area at the 500-level, including the project.
- A maximum of 6 credits may be taken at the 300-/400-level.
- A maximum of 6 credits of 500-level directed studies courses may be counted toward the program requirements.

For more information on general MEng requirements, please refer to the Academic Calendar:

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,195,838,0>

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## Core Courses

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All core courses are mandatory - students must register for core courses as listed below unless they have received prior credit.

Core Courses	Credits	Term
MECH 524 – Software Development for Mechatronic Systems <i>Exception: UBC BAsC in Mech with Mechatronics Option graduates should substitute with additional technical electives.</i> <sup>1</sup>	4	1
MECH 525 – Instrumentation for Mechatronic Systems <i>Exception: Electrical Engineering and UBC BAsC in Mech with Mechatronics Option graduates should substitute with additional technical electives.</i> <sup>1</sup>	4	2
MECH 509 – Controls <i>Exception: Those with prior credit for UBC Mech 468 or UBC Mech 522 should substitute additional technical electives.</i> <sup>1</sup>	4	2
MECH 526 – Mechatronic System Design Project I (Integrated Mechanical Design/analysis) <sup>2</sup>	6	Summer
MECH 527 – Mechatronic System Design Project II (Integrated Electronics, control, software design) <sup>2</sup>	6	Summer

<sup>1</sup> Students who have exceptions for core content should prepare a proposal plan of substitute courses. This list needs to be submitted to [students@mech.ubc.ca](mailto:students@mech.ubc.ca) for approval. Substitute courses must primarily be 500-level from Mechanical Engineering, Computer Science, and Electrical and Computer Engineering Departments.

<sup>2</sup> Students must take either MECH 526 or MECH 527 as their mechatronics project course. Students who are unable to find projects in the **summer/fall** are permitted to take two graduate courses (equivalent to 6 credits) to satisfy the project requirement on a case by case basis. Students must submit your request along with a rationale to [students@mech.ubc.ca](mailto:students@mech.ubc.ca) for approval. Please also provide a brief timeline outlining your plans to complete the MEng program.

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## Project Course

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Students must take either MECH 526 or MECH 527 as their mechatronics project course. The project must contain design and/or development of mechatronics machines/systems with the following content:

- **MECH 526 Mechatronic System Design Project I (6):** The project must demonstrate the application of mechanical engineering principles (solid mechanics, thermo – dynamics/heat transfer, fluid mechanics or vibrations) to design a machine or a mechanical system.
- **MECH 527 Mechatronic System Design Project II (6):** The project must demonstrate the application of electronics, sensors-actuators, or software to design a system.

### Registration Procedure:

The project is expected to be 4 months in length and is worth 6 credits. Students are responsible to find a project sponsor from industry or within a research laboratory at UBC on their own. A one page or shorter proposal must be submitted to the Program Director for approval to register into the course by the end of April. Only when the project is approved by the program director, MECH Student Services will register students into one of the project courses. The project may start at any time, but usually starts in May after completing 24 credits of regular coursework.

- An industrial project must have a principal supervisor at the company and an academic sponsor from UBC. If completing the project in industry, it is expected that the student will be paid by the industrial sponsor.
- If completing the project in a UBC research laboratory, the faculty member may pay the student, but it is not compulsory.

### Project Completion:

Upon completing the project, MEng students will need to present the project and submit a project report to the respective academic supervisor.

**Part 1: Final Project Report:** The project report must be written in a Master of Applied Science format, however, you do not need to include a detailed literature review. The report must be submitted to the examiners (supervisor and another faculty member selected by your supervisor) one week before the defense.

1. Abstract of the work
  2. Introduction (1-2 page): purpose and what you have done
  3. Present the work
  4. Conclusion
- Appendix: codes, design drawing, tables, etc.

Formatting templates can be found here:

MS Word: <https://researchcommons.library.ubc.ca/thesis-formatting-tips-tricks-and-resources/>  
LaTeX: <https://www.grad.ubc.ca/current-students/dissertation-thesis-preparation/style-guides-computer-tools>

**Part 2: Defense:** The presentation should be about 20 minutes, followed by a 10-minutes Q&A. The examining committee should include:

- The academic supervisor
- One additional supervisor from industry or a faculty member/Postdoctoral Fellow/senior Ph.D. The supervisor will select.

Students will receive a numeric grade (out of 100%) based on their final report and the defense. Students should time their defense accordingly before the last day of [exam period](#) for the Summer Session. Following the defense, the respective supervisor must submit the final report and presentation assessment to the Program Director who will assign the final grade. Grades must be entered into the system by the Program Director by the end of August.

**Note:** MEng students in Mechatronics Design are not permitted to participate in the Applied Science Co-op program. However, if the student finds an industrial sponsor or an academic supervisor with an acceptable project on their own, it is possible to take both MECH 526 and MECH 527 in 8-months long period as a Co-op or Intern student in industry or at the university laboratory, with the permission from program director.

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### Academic Progress

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The progress of all students is reviewed regularly by the program. At UBC, a minimum passing grade in any course taken by a student enrolled in a master's program is 60%, and students are only permitted up to 6 credits of coursework with grades between 60-70%.

MEng students will be required to withdraw from our program should their academic progress be deemed unsatisfactory. Examples of unsatisfactory academic progress include, but are not limited to:

- Failing one or more courses (obtaining a course grade of less than 60%)
- Obtaining between 60-67% in 6 credits or more

Students will be informed of unsatisfactory academic progress in writing before any action regarding withdrawal is taken. Program withdrawal will happen immediately following the academic term where unsatisfactory progress is made – students will not be allowed to stay in the program to finish the remainder of the academic session. In rare and exceptional circumstances, the Program Director may allow a student with unsatisfactory academic progress to remain in the program if they repeat failed courses or take approved alternative courses.

## Technical Electives

All Mechatronics Design MEng students are required to complete a minimum of 30 credits for their degree, which requires students to choose a minimum of 12 credits of technical electives. Students are responsible for choosing and registering themselves in their chosen technical electives. Approved technical electives can be found in the tables below. Important things to note about registering for technical electives:

- Graduate students are restricted to taking a maximum of 6 credits of undergraduate (300 or 400-level) courses throughout their program.
- Every technical elective listed below may not be offered every year, depending on departmental resources, so if you do not see it on SSC during registration, please check with the relevant department directly about availability.
- *Please note, not all courses will be available for 2024W*

Mechanical Engineering Technical Electives	Credits
MECH 420 – Sensors and actuators <sup>3</sup> <i>Not available to those with prior credit. See footnote for registration details.</i>	3
MECH 421 – Mechatronics System Instrumentation <sup>3</sup> <i>Not available to those with prior credit. See footnote for registration details</i>	4
MECH 506 – Linear Vibrations	3
MECH 507 – Analytical Dynamics	3
MECH 514 – Linear FEA in Solids and Heat Transfer <i>Not available to those with prior credit for UBC Mech 462.</i>	3
MECH 520 – Sensors and actuators	3
MECH 529 – Modeling of Dynamic Systems <i>Not available to those with prior credit for UBC Mech 469.</i>	3
MECH 540E – Emerging Topics in Mechatronics, Manufacturing, Controls, and Automation – Behavior in Manufacturing Processes	3
MECH 540F – Emerging Topics in Mechatronics, Manufacturing, Controls, and Automation – Data-Driven Modeling and Control of Dynamical Systems	3
MECH 540G – Emerging Topics in Mechatronics, Manufacturing, Controls, and Automation - Numerical and Trajectory Optimization	3
MECH 541 – Computer Control of Multi-Axis Machines <i>Not available to those with prior credit for UBC Mech 467 or UBC Mech 589.</i>	4
MECH 542 – CAD/CAM Principles and Practice <i>Not available to those with prior credit for UBC Mech 491 or MECH 596</i>	3
MECH 544 – Machine Tool Structures and Vibrations	3
MECH 563 – Robotics: Kinematics, Dynamics and Control <i>Not available to those with prior credit for UBC Mech 464.</i>	3

<sup>3</sup>Seats MECH 420 and/or MECH 421 are first reserved for undergraduate students; MEng students will only be offered registration in these courses after the first week of August if seats become available. Students wishing to register in these courses should register on the waitlist first if one is available. If you are unable to register for the waitlist, please contact [students@mech.ubc.ca](mailto:students@mech.ubc.ca) for registration assistance.

Students are *strongly encouraged* to choose technical electives offered by the Department of Mechanical Engineering, however are permitted to take **up to 6 credits** from the courses listed below offered by the Department of Computer Science, and the Department of Electrical and Computer Engineering. It is the student's responsibility to ensure that they meet the prerequisites for any electives you choose, and your ability to register in the below courses is at the offering department's discretion. Our office is only able to register students into MECH-coded courses. For any non-MECH courses, you will have to contact the individual department for registration assistance. **Note:** Students who wish to take technical electives that are not on the registration guide must submit a request to [students@mech.ubc.ca](mailto:students@mech.ubc.ca) for approval.

<b>Electrical and Computer Engineering Technical Electives</b>	<b>Credits</b>
ELEC 401 - Analog CMOS Integrated Circuit Design	3
ELEC 402 - Introduction to VLSI Systems	4
ELEC 403 - Advanced Digital VLSI Systems	3
ELEC 404 - RF Integrated Circuits	3
ELEC 412 - Optical Waveguides and Photonics	3
ELEC 421 - Digital Signal and Image Processing	3
ELEC 462 - Sensors and Actuators in Microsystems	3
ELEC 463 - Micro/Nanofabrication and Instrumentation Laboratory	3
ELEC 465 - Microsystems Design	3
ELEC 471 - Medical Imaging	3
ELEC 473 - Biological Micro-Electro-Mechanical Systems	3
ELEC 474 - Biophotonics	3
CPEN 411 - Computer Architecture	4
CPEN 412 - Microcomputer Systems Design	4
CPEN 421 - Software Project Management	4
CPEN 422 - Software Testing and Analysis	4
CPEN 431 - Design of Distributed Software Applications	4
CPEN 432 - Real-time System Design	4
CPEN 441 - Human Computer Interfaces in Engineering Design	4
EECE 514 - Software Verification and Testing	3
EECE 532 - Biomedical Microdevices	3
EECE 543 - Software Project Management	3
EECE 544 - Medical Imaging	3
EECE 549 - Dynamic Modeling of Electric Machines and Controls	3
EECE 574/ELEC 574 - Self-Tuning Control	3

<b>Manufacturing Engineering Technical Electives</b>	<b>Credits</b>
MANU 465 – AI and Machine Learning Applications in Manufacturing	3

<b>Computer Science Technical Electives</b>	<b>Credits</b>
CPSC 406 – Computational Optimization	3
CPSC 410 - Advanced Software Engineering	3
CPSC 415 - Advanced Operating Systems	3
CPSC 416 – Distributed Systems	3
CPSC 420 – Advanced Algorithms Design and Analysis	3
CPSC 422 - Intelligent Systems	3
CPSC 424 - Geometric Modeling	3
CPSC 425 - Computer Vision	3
CPSC 426 - Computer Animation	3
CPSC 444 - Advanced Methods for Human Computer Interaction	3
CPSC 504 - Data Management	3
CPSC 505 - Image Understanding I: Image Analysis	3
CPSC 507 - Software Engineering	3
CPSC 508 - Operating Systems	3
CPSC 509 - Programming Language Principles	3
CPSC 521 - Parallel Algorithms and Architectures	3
CPSC 522 - Artificial Intelligence II	3
CPSC 524 - Computer Graphics: Modeling	3
CPSC 526 - Computer Animation	3
CPSC 530P - Topics in Information Processing - SENSORIMOTOR CMP	3
CPSC 530K - Topics in Information Processing - DIGITAL LEARNING	3
CPSC 531H - Topics in Theory of Computation - MACH LRN THEORY	3
CPSC 532C - Topics in Artificial Intelligence - USER-CENTERED AI	3
CPSC 532L - Topics in Artificial Intelligence - VISION&LANGUAGE	3
CPSC 532M – Topics in Artificial Intelligence – INTRO ML AND DM	3
CPSC 532R - Topics in Artificial Intelligence - GRAPHICAL MODELS	3
CPSC 532S - Topics in Artificial Intelligence - VISION&LANGUAGE	3
CPSC 535P - Topics in Simulation and Optimization - DIGITAL HUMANS	3
CPSC 539F - Topics in Programming Languages - SD PRODUCTIVITY	3
CPSC 540 - Machine Learning	3
CPSC 543 - Physical User Interface Design and Evaluation	3
CPSC 544 - Human Computer Interaction	3
CPSC 554C - Topics in Human-Computer Interaction - ADAPTIVE INTERF	3
CPSC 547 - Information Visualization	3
CPSC 554K - Topics in Human-Computer Interaction – DFP PROJECT	3
CPSC 554Y - Topics in Human-Computer Interaction – AR/VR INTERCTN	3