

MECHANICAL ENGINEERING (MECH)

College of Engineering

Mechanical Engineering at Guelph is built around concepts of sustainability and sustainable design to equip graduates to tackle issues associated with emerging technologies. Graduates in mechanical engineering are able to apply mathematical, scientific and engineering principles to a wide variety of fields and find employment across the private and public sectors. The program provides students with a common base of knowledge essential to mechanical engineering, and then allows them to select from a menu of electives to attain a degree of specialization in one of five areas, or to choose electives which broaden their general knowledge base. Elective concentrations are available in the areas of wind and solar energy, food and beverage engineering, mechatronics, manufacturing system design and biomechanics.

Major Requirements (Honours)

This is a major within the degree: Bachelor of Engineering.

Credit Summary (22.50 Credits Total)

| Code | Title | Credits |
|--|-------|-------------|
| Required Core Courses | | 17.25 |
| Technical Electives | | 3.75 |
| Complementary Studies Electives ¹ | | 1.50 |
| Total Credits | | 22.5 |

¹ Consult BENG degree overview page for a full list of courses eligible for Complementary Studies Electives.

All students are admitted into the Co-op stream. Students who withdraw from the Co-op stream must speak with their Academic Advisor about completing the other program requirements. At least one summer academic semester will be required for students who complete the non-Co-op stream.

Core Courses

| Code | Title | Credits |
|-----------|---|---------|
| CHEM*1140 | General Chemistry I | 0.50 |
| CIS*1500 | Introduction to Programming | 0.50 |
| ENGG*1100 | Engineering and Design I | 0.75 |
| ENGG*1210 | Engineering Mechanics I | 0.50 |
| ENGG*1500 | Engineering Analysis | 0.50 |
| ENGG*2100 | Engineering and Design II | 0.75 |
| ENGG*2120 | Material Science | 0.50 |
| ENGG*2160 | Engineering Mechanics II | 0.50 |
| ENGG*2180 | Introduction to Manufacturing Processes | 0.50 |
| ENGG*2230 | Fluid Mechanics | 0.50 |
| ENGG*2340 | Kinematics and Dynamics | 0.50 |
| ENGG*2400 | Engineering Systems Analysis | 0.50 |
| ENGG*2450 | Electric Circuits | 0.50 |
| ENGG*2630 | Fundamental Thermodynamics | 0.50 |
| ENGG*3060 | Machine Elements | 0.50 |
| ENGG*3100 | Engineering and Design III | 0.75 |

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| ENGG*3140 | Mechanical Vibration | 0.50 |
| ENGG*3240 | Engineering Economics | 0.50 |
| ENGG*3370 | Applied Fluids and Thermodynamics | 0.50 |
| ENGG*3410 | Systems and Control Theory | 0.50 |
| ENGG*3430 | Heat and Mass Transfer | 0.50 |
| ENGG*3510 | Electromechanical Devices | 0.50 |
| ENGG*3960 | Machine Design | 0.50 |
| ENGG*4000 | Proposal for Engineering Design IV | 0.00 |
| ENGG*4160 | Mechanical Engineering Design IV | 1.00 |
| HIST*1250 | Science and Technology in a Global Context | 0.50 |
| MATH*1200 | Calculus I | 0.50 |
| MATH*1210 | Calculus II | 0.50 |
| MATH*2130 | Numerical Methods | 0.50 |
| MATH*2270 | Applied Differential Equations | 0.50 |
| PHYS*1010 | Introductory Electricity and Magnetism | 0.50 |
| PHYS*1130 | Physics with Applications | 0.50 |
| STAT*2120 | Probability and Statistics for Engineers | 0.50 |

Technical Electives

| Code | Title | Credits |
|--|--|---------|
| MECH-1 Mechanical Engineering Electives | | |
| Select 3.00 credits from the following: | | |
| ENGG*2410 | Digital Systems Design Using Descriptive Languages | 0.50 |
| ENGG*3070 | Integrated Manufacturing Systems | 0.50 |
| ENGG*3080 | Energy Resources and Technologies | 0.50 |
| ENGG*3120 | Computer Aided Design and Manufacturing | 0.75 |
| ENGG*3150 | Engineering Biomechanics | 0.50 |
| ENGG*3170 | Biomaterials | 0.50 |
| ENGG*3250 | Energy Management and Utilization | 0.50 |
| ENGG*3390 | Signal Processing | 0.50 |
| ENGG*3450 | Electronic Devices | 0.50 |
| ENGG*3490 | Introduction to Mechatronic Systems Design | 0.75 |
| ENGG*3640 | Microcomputer Interfacing | 0.50 |
| ENGG*3700 | Optimization for Engineers | 0.50 |
| ENGG*4050 | Quality Control | 0.50 |
| ENGG*4230 | Energy Conversion | 0.75 |
| ENGG*4430 | Neuro-Fuzzy and Soft Computing Systems | 0.50 |
| ENGG*4440 | Computational Fluid Dynamics | 0.50 |
| ENGG*4460 | Robotic Systems | 0.50 |
| ENGG*4470 | Finite Element Analysis | 0.50 |
| ENGG*4490 | Sampled Data Control Design | 0.75 |
| ENGG*4510 | Assessment and Management of Risk | 0.50 |
| ENGG*4660 | Medical Image Processing | 0.50 |
| MECH-2 Mechanical Engineering Electives | | |
| Select 0.75 credits from the following: | | |
| ENGG*4030 | Manufacturing System Design | 0.75 |
| ENGG*4220 | Interdisciplinary Mechanical Engineering Design | 0.75 |
| ENGG*4400 | Biomechanical Engineering Design | 0.75 |

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| ENGG*4480 | Advanced Mechatronic Systems Design | 0.75 |
| ENGG*4580 | Sustainable Energy Systems Design | 0.75 |

Co-op Requirements (Honours)

This is a major within the degree: Bachelor of Engineering.

The Co-op program in Mechanical Engineering is a five year program, including five work terms. Students must follow the academic work schedule as outlined below (also found on the Co-operative Education website: <https://www.recruitguelph.ca/cecs/>).

Academic and Co-op Work Term Schedule

| Year | Fall | Winter | Summer |
|------|----------------------------------|------------------------|-----------------------|
| 1 | Academic Semester 1 | Academic Semester 2 | Off |
| 2 | Academic Semester 3 COOP*1100 | Academic Semester 4 | COOP*1000 Work Term I |
| 3 | Academic Semester 5 | COOP*2000 Work Term II | Academic Semester 6 |
| 4 | COOP*3000 Work Term III | COOP*4000 Work Term IV | COOP*5000 Work Term V |
| 5 | Academic Semester 7 | Academic Semester 8 | N/A |

Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary

(25.00 Total Credits)

| Code | Title | Credits |
|--|-------|-----------|
| Required Core Courses | | 17.25 |
| MECH-1 Mechanical Engineering Electives | | 3.00 |
| MECH-2 Mechanical Engineering Design Electives | | 0.75 |
| Complementary Studies Electives | | 1.50 |
| Co-op Work Terms | | 2.50 |
| Total Credits | | 25 |

Recommended Program Sequence

| Code | Title | Credits |
|----------------------------|-----------------------------|---------|
| Semester 1 - Fall | | |
| CHEM*1140 | General Chemistry I | 0.50 |
| CIS*1500 | Introduction to Programming | 0.50 |
| ENGG*1100 | Engineering and Design I | 0.75 |
| MATH*1200 | Calculus I | 0.50 |
| PHYS*1130 | Physics with Applications | 0.50 |
| Semester 2 - Winter | | |
| ENGG*1210 | Engineering Mechanics I | 0.50 |
| ENGG*1500 | Engineering Analysis | 0.50 |
| ENGG*2120 | Material Science | 0.50 |
| MATH*1210 | Calculus II | 0.50 |

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| PHYS*1010 | Introductory Electricity and Magnetism | 0.50 |
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Summer Semester

No academic semester or work term

Semester 3 - Fall

| | | |
|-----------|--|------|
| COOP*1100 | Introduction to Co-operative Education | 0.00 |
| ENGG*2100 | Engineering and Design II | 0.75 |
| ENGG*2160 | Engineering Mechanics II | 0.50 |
| ENGG*2400 | Engineering Systems Analysis | 0.50 |
| ENGG*2630 | Fundamental Thermodynamics | 0.50 |
| MATH*2270 | Applied Differential Equations | 0.50 |

Semester 4 - Winter

| | | |
|-----------|--|------|
| ENGG*2180 | Introduction to Manufacturing Processes | 0.50 |
| ENGG*2230 | Fluid Mechanics | 0.50 |
| ENGG*2340 | Kinematics and Dynamics | 0.50 |
| ENGG*2450 | Electric Circuits | 0.50 |
| MATH*2130 | Numerical Methods | 0.50 |
| STAT*2120 | Probability and Statistics for Engineers | 0.50 |

Summer Semester

| | | |
|-----------|-------------------|------|
| COOP*1000 | Co-op Work Term I | 0.50 |
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Semester 5 - Fall

| | | |
|---------------------------|--|------|
| ENGG*3060 | Machine Elements | 0.50 |
| ENGG*3240 | Engineering Economics | 0.50 |
| ENGG*3430 | Heat and Mass Transfer | 0.50 |
| ENGG*3510 | Electromechanical Devices | 0.50 |
| HIST*1250 | Science and Technology in a Global Context | 0.50 |
| 0.50 restricted electives | | 0.50 |

Winter Semester

| | | |
|-----------|--------------------|------|
| COOP*2000 | Co-op Work Term II | 0.50 |
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Semester 6 - Summer

| | | |
|---------------------------|-----------------------------------|------|
| ENGG*3100 | Engineering and Design III | 0.75 |
| ENGG*3370 | Applied Fluids and Thermodynamics | 0.50 |
| ENGG*3410 | Systems and Control Theory | 0.50 |
| ENGG*3960 | Machine Design | 0.50 |
| 0.50 restricted electives | | 0.50 |

Fall Semester

| | | |
|-----------|---------------------|------|
| COOP*3000 | Co-op Work Term III | 0.50 |
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Winter Semester

| | | |
|-----------|--------------------|------|
| COOP*4000 | Co-op Work Term IV | 0.50 |
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Summer Semester

| | | |
|-----------|-------------------|------|
| COOP*5000 | Co-op Work Term V | 0.50 |
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Semester 7 - Fall

| | | |
|---------------------------|------------------------------------|------|
| ENGG*3140 | Mechanical Vibration | 0.50 |
| ENGG*4000 | Proposal for Engineering Design IV | 0.00 |
| 2.50 restricted electives | | 2.50 |

Semester 8 - Winter

| | | |
|---------------------------|----------------------------------|------|
| ENGG*4160 | Mechanical Engineering Design IV | 1.00 |
| 1.75 restricted electives | | 1.75 |

Restricted Electives

(see Program Guide for more information)

The Engineering Program requires Mechanical Engineering students to complete the following combination of elective credits, totaling a minimum of 5.25 credits, to complete their program.

| Code | Title | Credits |
|--|--|---------|
| 1.50 credits from Complementary Studies electives | | |
| Consult the Program Guide for a full list of courses eligible for Complementary Studies Electives. | | |
| 3.00 credits of Mechanical Engineering Electives, List MECH-1: | | |
| ENGG*2410 | Digital Systems Design Using Descriptive Languages | 0.50 |
| ENGG*3070 | Integrated Manufacturing Systems | 0.50 |
| ENGG*3080 | Energy Resources and Technologies | 0.50 |
| ENGG*3120 | Computer Aided Design and Manufacturing | 0.50 |
| ENGG*3150 | Engineering Biomechanics | 0.50 |
| ENGG*3170 | Biomaterials | 0.50 |
| ENGG*3250 | Energy Management and Utilization | 0.50 |
| ENGG*3390 | Signal Processing | 0.50 |
| ENGG*3450 | Electronic Devices | 0.50 |
| ENGG*3490 | Introduction to Mechatronic Systems Design | 0.75 |
| ENGG*3640 | Microcomputer Interfacing | 0.50 |
| ENGG*3700 | Optimization for Engineers | 0.50 |
| ENGG*4050 | Quality Control | 0.50 |
| ENGG*4230 | Energy Conversion | 0.75 |
| ENGG*4430 | Neuro-Fuzzy and Soft Computing Systems | 0.50 |
| ENGG*4440 | Computational Fluid Dynamics | 0.50 |
| ENGG*4460 | Robotic Systems | 0.50 |
| ENGG*4470 | Finite Element Analysis | 0.50 |
| ENGG*4490 | Sampled Data Control Design | 0.75 |
| ENGG*4510 | Assessment and Management of Risk | 0.50 |
| ENGG*4660 | Medical Image Processing | 0.50 |
| 0.75 credits of Mechanical Engineering Design Electives, List MECH-2: | | |
| ENGG*4030 | Manufacturing System Design | 0.75 |
| ENGG*4220 | Interdisciplinary Mechanical Engineering Design | 0.75 |
| ENGG*4400 | Biomechanical Engineering Design | 0.75 |
| ENGG*4480 | Advanced Mechatronic Systems Design | 0.75 |