Mechanical Engineering

Important Information for your Final Year

2026

Outline

1. Why are you here?
2. Enrolment Tips
3. Electives (and ‘Unique’ Courses)
4. Capstone
5. Graduate Studies
6. Student Panel

Required Courses

1. Check your advisement report

2. MECHENG 4V03 (Thermo-fluids)
   - Pre-reqs (2W, 3O, 3R)
   - Pinch point

3. MECHENG 4P03 (Composite labs)
   - Sections fill quickly! Watch out for both terms
   - Pre-req (2Q, 3M A/B)
   - Co-op: check with instructor re. carrying over grades

4. ENGINEER 4A03 (Ethics, equity, law)
   - Take in either term

Enrolment

1. Know your dates!
   - Timetable released before enrolment opens
   - Plan your full year at once (don’t leave winter to December)
2. Review course outlines on website
   - Check academic calendar for pre-reqs
3. Pick more courses than needed (*i.e.* have backups)
   - No wait lists, watch for a seat
   - Not all courses are conflict free
   - Waivers exist but not ideal for learning
   - Not all courses offered every year

Enrolment

4. Streams
    - General, Mechanics & Design, Manufacturing, Smart Systems, Thermofluids and Energy Systems
    - Recommended grouping of electives – does not appear on your transcript
    - Some streams have requirements (e.g. 4S03)

5. Some courses fill very quickly
    - 4B03, 4Z03
    - Watch that you take correct version for ibio electives

6. Out of department electives
    - Great option, happy to review and approve
    - Check for pre-req knowledge

For Assistance

Contacts:

Dr. Quenneville quennev@mcmaster.ca

Nicole Mclean mech@mcmaster.ca

Sinah Lee leesk2@mcmaster.ca

*Be aware enrolment is a hectic time it may take a bit to get a response

Q&A on Enrolment

Electives (will be updated mid-spring)

- CHEM ENG 4T03 Applications of Chemical Engineering in Medicine, 2nd term
- CHEM ENG 4X03: Polymer Processing, 1st term
- CIV ENG 3K03: Introduction to Transportation Engineering, 1st term
- COMMERCE 4QA3: Operations Modelling and Analysis, 1st or 2nd term
- ELECENG 3N03: Electronics and Instrumentation, 2nd term
- ENGINEER 4EX3: Experiential Engineering Design, both terms
- MATLS 3MF3: Materials Fabrication, 2nd term
- MATLS 4MS4: Materials Selection in Design and Manufacturing, 1st term
- MATLS 4T03: Properties and Processing of Composites, 2nd term
- ENG PHYS 3D03: Principles of Nuclear Engineering, 2nd term
- ENG PHYS 3SP3: Space Systems Engineering
- ENG PHYS 4D03: Nuclear Reactor Analysis, 1st term (Note: pre-req. is ENG PHYS 3D03)
- ENG PHYS 4NE3: Advanced Nuclear Engineering, 2nd term (Note: pre-req. is ENG PHYS 3D03)
- ENG PHYS 4P03: Nuclear Power Plant Systems & Operations, 2nd term
- SMRTTECH 4ID3: IoT Devices and Networks, 2nd term
- SMRTTECH 4AI3: Artificial Intelligence and Machine Learning, 1st term
- PROCTECH 4MH3: Machine Health & Remote Monitoring, 1st term
- SFWRTECH 4DA3: Data analytics and Big Data, virtual
- SFWRTECH 4ES3: Real-Time Systems, virtual

- ME 4AA3: Aerodynamics, 2nd term (Dr. Tullis)
- ME 4AI3: Applied Artificial Intelligence, 2nd term (Dr. Ahmed)
- ME 4B03: Topics in Product Development, 1st term (Dr. Hassan)
- ME 4BB3: Biomechanics, 1st term (Dr. Wohl)
- ME 4BF3: Biofluid Mechanics Systems (Dr. Motamed)
- ME 4CC3: Experimental and Computational Biomechanics, 2nd term (Dr. Quenneville)
- ME 4D03: Manufacturing Processes (Metal Removal), 2nd term (Dr. Koshy)
- ME 4DD3: Introduction to Surface Engineering in Manufacturing, 2nd term (Dr. Aramesh)
- ME 4ES3: Energy Storage, 2nd term (Dr. Trowell)
- ME 4FM3: Advanced Instrumentation and Sensing for Fluid Mechanics, 2nd term (Dr. Morton)
- ME 4H03: Mechatronics, 2nd term (Dr. Bone)
- ME 4I03: Noise Analysis and Control, 1st term (TBD)
- ME 4J03: Intro to Computational Fluid Dynamics & Heat Transfer (Dr. Hamed)
- ME 4K03: Robotics, 1st term (Dr. Yan)
- ME 4N03: NanoBio Engineering (Dr. Didar)
- ME 4O04: Sustainable Energy Systems, 2nd term (Dr. Cotton)
- ME 4SS3: Smart Systems, 1st term (Dr. Gadsden)
- ME 4S03: Incompressible flow, 1st term (Dr. Salaudeen)
- ME 4T03: Finite Element Applications, 1st term & 2nd term (Dr. Wu)
- ME 4U03: Compressible Flow and Turbomachinery, 1st term (Dr. Tullis)
- ME 4W03: Air Conditioning and Refrigeration Systems, 2nd term (Dr. Shankar)
- ME 4X04: Independent Research Project, both terms
- ME 4Y03: Internal Combustion Engines, 1st term (Dr. Yan)
- ME 4Z03: Computer Aided Design, 2nd term (TBD)

Some Unique Courses

- MME 4490: Engineering in Global Context: Advanced Manufacturing
  - Through Western U, held at Karlsruhe Institute of Technology, Germany
  - Topics: automated manufacturing systems, machining of fiber reinforced composites, modeling and simulation in mech eng, manufacturing of composite parts for automotive applications, functional composite films, thin film manufacturing
  - Runs in May of each year (take prior to final year, register in Feb)
  - Includes things like trip to Mercedes plant, Porsche Museum
  - Contact Dr Tutunea-Fatan for info rtutunea@eng.uwo.ca

Some Unique Courses

- MECHENG 4X04: Independent Project
  - A fun opportunity to get in-depth experience in your area of interest
  - Good prep if you're considering a Master's
  - Key is to secure a supervisor
  - Available through all streams, full year course (1-term version available as 4XA3)
  - Evaluated based on two presentations and reports
  - Contact me for more info

- ENGINEER 4EX3: Experiential Engineering Design
  - For members of clubs/teams, full year course
  - Contact Dr Hassan for more info

Q&A on Electives

Capstone (4M06)

1. Has pre-reqs (3E03, 3R03)
   - Use summer 3R offering or waivers as needed
2. Fall lectures (and quiz); no lectures in winter
3. Groups of 2-4 members
   - Form early! If no group, will be assigned one
   - Pick people you work well with, with similar interests
4. Significant project effort ~6 hr/wk fall, ~12 hr/wk winter
5. Deliverables:
   - Written: scope of work, Dec project report, final report
   - Oral: Nov and Mar presentations, prototype demo Feb
   - Expo participation, design journals, peer evals

4M06 Communication

1. Avenue, but also…
2. 2026-27 Capstone Virtual Group (MS Teams)
3. Will start through the summer!

✓ This helps get groups formed and projects assigned within 1-2 weeks of term start so you can start design work ASAP

Projects

- Provide students with projects that involve developing a solution to an "**open ended**" mechanical engineering design problem in the context of a senior year 2-term project course.

- Projects can be either faculty-proposed or student-proposed
  - Come up with your own project ideas **well in advance!**

- RECOMMENDATION: Attend Capstone Showcase on April 7th to see examples

Faculty-Proposed Projects

- Many faculty in the department participate in 4M06
  - E.g. 15 this year
- Over the summer, each submits several project ideas
  - Often related to research interests
- These are approved and posted to Avenue in September
- Projects include design, analysis, building and testing
  - Department has budget for prototyping
- Groups submit preferences
- Projects allocated by course coordinator

Student-Proposed Projects

Requirements:

- Major emphasis on **design** in every project
- Most projects involve not only design but build and test phases
- The only way to get a ‘reserved’ project

Process (done in spring/summer):

- Form a group, develop your idea
- Reach out to either course coordinator or a faculty member who would be appropriate to advise (based on expertise)
- Work together to complete a full proposal, which advisor will submit

Capstone (4M06) Supervisors

Dr Ryan Ahmed

Dr Maryam Aramesh

Dr Chan Ching

Dr Jim Cotton

Dr Duncan Cree

Dr Saeid Habibi

Dr Mohamed Hamed

Dr Liz Hassan

Dr Phil Koshy

Dr Chris Morton

Dr Zahra Motamed

Dr Shakir Salaudeen

Dr Stephen Tullis

Dr Stephen Veldhuis

Dr Fengjun Yan

Student-Proposed Projects

Start planning early!

- e.g. Dr Veldhuis *currently* putting together MCA competition team

Find a supervisor with relevant expertise.

Project will go through several iterations as you refine it with supervisor and ensure meets course requirements (confirmed by coordinator).

<u>Ideas:</u>

Big push for entrepreneurial efforts at McMaster. Do you want a startup?

Did a project develop out of summer job? Helps keep link with employer?

Capstone (5P06)

1. Multidisciplinary design project reinforcing both mechanical and biomedical engineering
2. Fall lectures (and quizzes); no lectures in winter
3. Groups of 2-5 members
    - If a single discipline, 2-4 students
    - If two disciplines, up to 5 students
    - Pick people you work well with, with similar interests
    - As with 4M06, individuals may be added if necessary
4. Supervised by a Lead Instructor (bio) and Disciplinary Instructor(s) (mech + other)
    - Minimum monthly meetings with each

Project Definition

- Projects can be student developed or externally developed
- Each project has a ‘stakeholder’, defines the problem (user needs)
- Meet monthly with them for feedback

Process:

- Over summer we solicit projects from faculty, clinicians, other partners, complete a scoping description
  - Student groups may complete description and get it approved
- Posted and updated regularly on Avenue thru September
- Groups contact stakeholder to get information and express interest
- Form completed to pick and stakeholder approval obtained

Deliverables

- Written:
  - Disciplinary justification, 3 project reports (in chapters) and final report
- Oral:
  - Proof of concept demo, final demo, expo poster presentation

- Budget available for prototyping
- Mech&ibio students have access to technical staff and mech shop
- Also have access to ibio labs & techs

Q&A on Capstone

- $6,000 award + top up from supervisor
- Full time, 14-16 weeks
- Canadian citizen or PR
- cGPA of B- (realistically higher)
- Unlimited for self-identified Black and/or Indigenous students

- Need a supervisor to agree, fill out simple form
- Due Feb 2!

Graduate Studies

- Research intensive program provides more advanced training in an area of interest – more depth and breadth of knowledge
- Doing something new, problem solving, write and defend a thesis
- Prepare for technical leadership and specialization
- Grad co-op program available

Admissions:

- Need a supervisor: oversees research, funds work
- B- average (can be waived), can start any semester
- Best graduate students have problem solving skills, resilience, self drive, curiosity, communication skills

Tips

- Research experience great (summer job, 4X04) but not required
- A good supervisor / lab group is so important
  - Meet their current graduate students
- Reach out usually early in new year
  - Ability to accept students often depends on funding
- Emphasize what you bring that's unique
  - Hands on skills? Organized multi-tasker?
- Know what they do (generally), articulate how aligns with your career goals
- Line up good references (need 2 typically)
- Application is often last step – make that connection first

Research Areas – on mech website

Areas of specialization

The department of Mechanical Engineering is home to excellent faculty members and researchers with expertise in various areas of specialization.

Discover our research →

Advanced Manufacturing

Biomechanics

Energy & Fluid Systems

Mechanics & Design

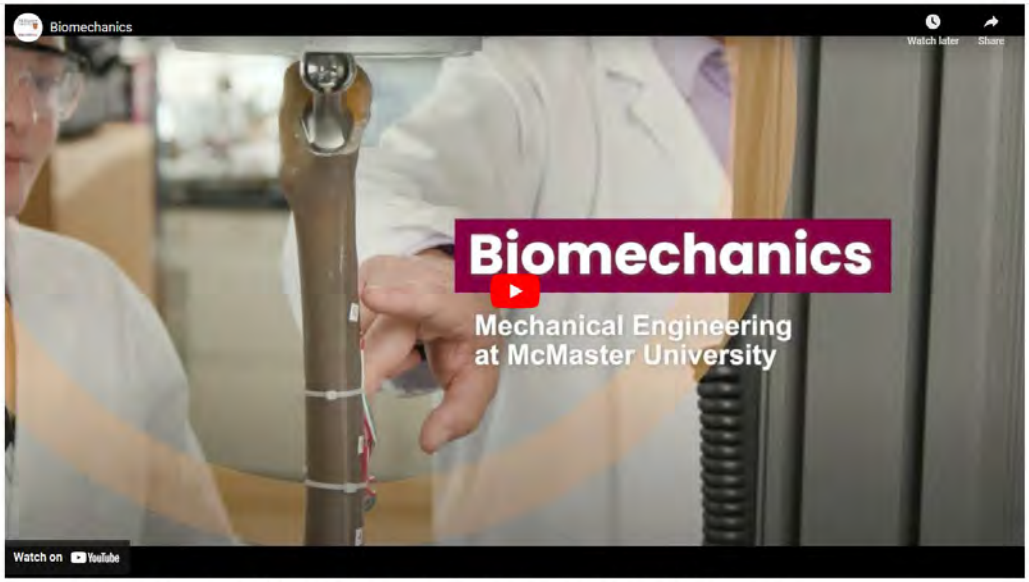
Smart Systems

YouTube video for each area!

Home / Mechanical Engineering / Research / Biomechanics

Departments

- Chemical Engineering
- Civil Engineering
- Computing & Software
- Electrical & Computer Engineering
- Engineering Physics
- Integrated Biomedical Engineering & Health Sciences
- Materials Science & Engineering
- Mechanical Engineering
  - Degree options
  - Courses
  - Research



Check out this video about Biomechanics at McMaster Engineering and scroll down to learn about the faculty involved in this research.

M.A.Sc. Degree

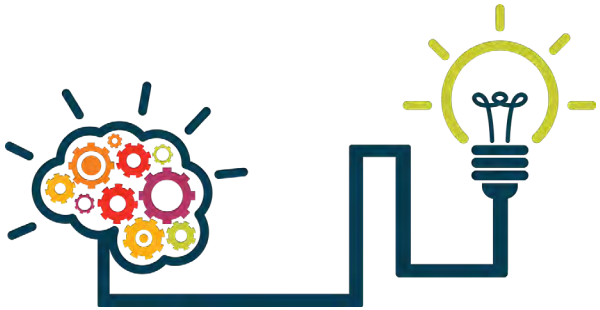
- Thesis-based
- Generally 2 years full-time (can do part-time)
- Can continue or transfer to Ph.D. studies

Degree Requirements:

- 4x Level 700 courses (1 Level 600 course is allowed)
- Seminar attendance & presentation, Supervisory Committee Meeting

Receive funding from TA-ing, research supervisor, scholarship(s)

  - Varies by status, but minimum total funding ~$25k
  - May be eligible for top ups or larger scholarships



Accelerated M.A.Sc. Degree

- Marketed as a M.A.Sc. in 12 to 16 months
  - This varies
- Undergraduate research counted towards M.A.Sc. Thesis
- One Class counts for both B.Eng and M.A.Sc.
- Same academic requirements & funding as regular, full-time M.A.Sc. students

Ph.D. Degree

- Thesis-based
- Generally ~4 years full-time

Degree Requirements:

- 2x Level 700 courses
- Seminar attendance & presentation, Supervisory Committee Meetings
- Comprehensive exam

Receive funding from TA-ing, research supervisor, scholarship(s)

  - Varies by status, but minimum total funding ~$27k
  - May be eligible for top ups or larger scholarships

Industrial PhD, Direct to PhD -> options

Student Panel

Questions?