

Mechanical Engineering Undergraduate Technical Electives		Prerequisites	Fall 2022	Winter 2023
Aerospace Option List A: (All 3 from list A)				
MECH 3520 Aerodynamics	MECH 3492			Ferguson
MECH 4182 Aerospace Structures: Analysis and Design	MECH 3502			Telichev
MECH 4192 Aerospace Materials and Manufacturing Processes	MECH 3542			Jayaraman
Aerospace Option Cont. List B: (Choose 2 from list B)				
MECH 3582 Manufacturing Planning and Quality Control	MECH 2112		Peng	
MECH 4200 Gas Turbine Propulsion Systems	MECH 2202, 3520		Birouk	
MECH 4432 Systems Engineering (Special Permission required)	Instructor Approval		Not Offered 2022/23	
MECH 4452 Aircraft Performance, Dynamics, and Design	MECH 3520			Chatoorgoon
MECH 4482 Applied Aerospace Instrumentation	MECH 3430, 3982, 3992		Not Offered 2022/23	
ENG 4110 Operational Excellence	STAT 2220 (MECH 3170 recom.)		Campbell	Campbell
Aerospace Stream (Choose 3 from list below)				
MECH 3520 Aerodynamics	MECH 3492			Ferguson
MECH 4182 Aerospace Structures: Analysis and Design	MECH 3502			Telichev
MECH 4192 Aerospace Materials and Manufacturing Processes	MECH 3542			Jayaraman
MECH 4200 Gas Turbine Propulsion Systems	MECH 2202, 3520		Birouk	
MECH 4452 Aircraft Performance, Dynamics, and Design	MECH 3520			Chatoorgoon
Manufacturing Stream (Choose 3 from list below)				
MECH 3550 Robotics & Computer Numerical Control	MECH 2112		Not Offered 2022/23	
MECH 3562 Introduction to Optimization	STAT 2220		Not Offered 2022/23	
MECH 3570 Manufacturing Automation	MECH 3550		Not Offered 2022/23	
MECH 3582 Manufacturing Planning and Quality Control	MECH 2112		Peng	
MECH 3592 Simulation Modeling and Facilities Planning	MECH 2112			Peng
MECH 4192 Aerospace Materials and Manufacturing Processes	MECH 3542			Jayaraman
MECH 4240 Design for Manufacturing	MECH 3542		Not Offered 2022/23	
MECH 4330 Cont. Topics in Manufacturing 1: Appl. Mfg. Eng	MECH 3502 Pre/Co 3652		Not Offered 2022/23	
MECH 4330 Cont. Topics in Manufacturing 1: CIMA 1	MECH 2112		S. Balakrishnan	
MECH 4342 Cont. Topics in Manufacturing 2: CIMA 2	CIMA 1 MECH 4330			S. Balakrishnan
MECH 4342 Cont. Topics in Manufacturing 2: Precision Multi-Axis Control	MECH 3430		Not Offered 2022/23	
MECH 4900 Mechatronics System Design	MECH 4340			Sepehri
Materials Stream (Choose 3 from list below)				
MECH 4192 Aerospace Materials and Manufacturing Processes	MECH 3542			Jayaraman
MECH 4310 Cont. Topics in Mech Eng 1: Analysis of Composite & Multi. Matls	MECH 3502		Not Offered 2022/23	
MECH 4350 Topics in Eng. Matls 1: Properties and Apps of Nanomaterials			Not Offered 2022/23	
MECH 4360 Topics in Eng. Materials 2: Biomaterials for Medical Applications	CHEM 1310 or 1110 / 1126, Year Class 3,4,5			Xing
MECH 4620 Corrosion of Metals and Alloys	MECH 3542		Not Offered 2022/23	
MECH 4870 Fracture and Failure of Engineering Materials	MECH 3542		Zhu	
Solid Mechanics Stream (Choose 3 from list below)				
MECH 4182 Aerospace Structures: Analysis and Design	MECH 3502			Telichev
MECH 4322 T08 Cont. Topics in Mech Eng 2: Reliability Engineering	STAT 2220 & MATH 2130 or MATH 2132		Liang	
MECH 4322 T03 Cont. Topics in Mech Eng 2: Design of Biomechanical Devices	MECH 2112			O'Brien
MECH 4322 T11 Vibration Based Condition Monitoring	MECH 3420		Wu	
MECH 4452 Aircraft Performance, Dynamics, and Design	MECH 3520			Chatoorgoon
MECH 4472 Mechanical Vibration	MECH 3420		Not Offered 2022/23	
MECH 4510 Fundamentals of Finite Element Analysis	MATH 2120 & 3132 and MECH 2222		Not Offered 2022/23	
MECH 4532 Advanced Strength of Materials	MECH 3542		Not Offered 2022/23	
MECH 4550 Noise Control	MECH 3420		Not Offered 2022/23	
MECH 4672 Advanced Mechanical Design	MECH 3482		Not Offered 2022/23	
MECH 4812 Automotive Engineering	MECH 3502 Pre/Co MECH 3420		Not Offered 2022/23	

Thermofluids Stream (Choose 3 from list below)			
MECH 3520 Aerodynamics	MECH 3492		Ferguson
MECH 4200 Gas Turbine Propulsion Systems	MECH 2202 / 3520	Birouk	
MECH 4292 IC Engines	MECH 2202	Not Offered 2022/23	
MECH 4412 Heating, Ventilation, and Air Conditioning	MECH 2202	Guyot	
MECH 4542 Principles of Turbomachinery	MECH 2202 & 3492	Not Offered 2022/23	
MECH 4560 Selected Topics in Fluid Mechanics 4M: Fluid Turbulence	MATH 3132, MECH 3492	Not Offered 2022/23	
MECH 4680 Energy Conversion and Utilization		Not Offered 2022/23	
MECH 4692 Renewable Energy	MECH 2202, 2262 Pre/Co 3460		Bibeau
MECH 4694 Advanced Topics in Heat Transfer	MECH 3460	Not Offered 2022/23	
MECH 4702 Design of Thermal Systems	MECH 2202	Not Offered 2022/23	
MECH 4822 Numerical Heat Transfer in Fluid Flow	MATH 3132, MECH 3460, 3492	Ormiston	
Other Electives			
MECH 4162 Thesis – Students should have a 3.0 DGPA or higher	Eligible to Graduate	Balakrishnan (spanned course)	
MECH 4310 Cont. Topics in Mech Eng 1: Fluid Power Systems	MECH 2112		Sepehri
MECH 4322 Cont. Topics in Mech Eng 2: Adv. Graphical Communication	MECH 2112	Not Offered 2022/23	
MECH 4322 T06 Cont. Topics in Mech Eng 2: Interdisciplinary Design	Year class 3, 4 or 5		Labossiere

Technical Elective Option and Streams in Mechanical Engineering

Students are required to take has 5 Technical Elective (TE) slots to be filled with non-core courses of your choice from the list of technical electives offered each year. Students wishing to pursue a variety of Mechanical topics have the chance here to do so by choosing courses in a variety of subject/research areas.

The 5 Technical Elective spots can be filled with courses from our Aerospace Option or Streams in Aerospace, Materials, Solid Mechanics, Thermofluids and Manufacturing.

Options and Streams are not mandatory. Students may choose to take one technical elective from each area commonly referred to as a general focus degree.

To obtain the Aerospace Option students must take all courses from List A and a choice of 2 from List B. A Stream consists of 3 courses out of 5 TE slots.

To obtain a stream on your transcript select 3 TE courses from the stream area of your choice and 2 TE courses from the same area, another area or Thesis.

Students interested in research and experimentation have the option of replacing 2 Technical Elective slots with a 6-credit-hour Thesis (MECH 4162). Work on the thesis is done under the supervision of a Faculty Advisor and begins in September with an April completion date, done in the student's graduating year.

Please note:

- 1) Technical Electives listed above may vary from year to year and may have limited space.
- 2) Students are urged to consult the Mechanical Engineering office or the website for a current list of technical electives offered.
- 3) Students must be in their graduating year to register for MECH 4162 Thesis.
- 4) Students may NOT use the same technical elective to count toward multiple streams.

Please note: Although it may be stated that Departmental Permission is required in Aurora, as long as you meet the pre/corequisite noted above you may go ahead and register for the course. There is NO need to request Departmental Permission if you hold the pre/corequisite.

<https://umanitoba.ca/engineering/mechanical>