



MARS Course Guide

2023



Contents

1	Introduction	4
1.1	About MARS	4
2	Membership	5
3	Recommended Enrolment Plan	6
3.1	Bachelor of Engineering (Honours)	6
3.1.1	Program Structure	6
3.1.2	Major Options	7
3.1.3	Minor Options	7
3.1.4	Open Major	8
3.2	Bachelor of Engineering (Honours) and Master of Engineering	9
3.2.1	Program Structure	9
3.2.2	Advanced Electives	10
3.2.3	Masters Electives	10
4	Electives	11
4.1	Electrical Engineering	11
4.2	Mechanical Engineering	11
4.3	Software Engineering	11
4.4	Computer Science	11
5	Course Profiles	13
5.1	AERO4300 - Aerospace Composites	14
5.2	AERO4450 - Aerospace Propulsion	14
5.3	AERO4470 - Hypersonics	14
5.4	AERO4800 - Space Engineering	14
5.5	COMP3506 - Algorithms & Data Structures	14
5.6	COMP3702 - Artificial Intelligence	14
5.7	COMP3710 - Pattern Recognition and Analysis	14
5.8	COMP4702 - Machine Learning	14
5.9	COSC2500 - Numerical Methods in Computational Science	14
5.10	COSC3000 - Visualization, Computer Graphics & Data Analysis	14
5.11	COSC3500 - High-Performance Computing	14
5.12	CSSE1001 - Introduction to Software Engineering	14
5.13	CSSE2002 - Programming in the Large	14
5.14	CSSE2010 - Introduction to Computer Systems	14
5.15	CSSE2310 - Computer Systems Principles and Programming	14
5.16	CSSE3010 - Embedded Systems Design & Interfacing	14
5.17	CSSE4010 - Digital System Design	14

5.18 CSSE4011 - Advanced Embedded Systems	14
5.19 CSSE7610 - Concurrency: Theory and Practice	14
5.20 DATA2001 - Fundamentals of Data Science	14
5.21 DSGN1100 - Design: Interaction	14
5.22 DSGN1200 - Design: Experience	14
5.23 DSGN1500 - Design for a Better World	14
5.24 DSGN2100 - Design: Organisation	14
5.25 DSGN2200 - Design: Environment	14
5.26 DSGN3100 - Design: Infrastructure	14
5.27 ELEC2004 - Circuits, Signals & Systems	14
5.28 ELEC2300 - Fundamentals of Electromagnetism and Electromechanics	14
5.29 ELEC2400 - Electronic Devices and Circuits	14
5.30 ELEC3004 - Signals, Systems & Control	14
5.31 ELEC3100 - Fundamentals of Electromagnetic Fields & Waves	14
5.32 ELEC3310 - Electrical Energy Conversion & Utilisation	14
5.33 ELEC4310 - Power Systems Analysis	14
5.34 ELEC4410 - Advanced Electronic & Power Electronics Design	14
5.35 ELEC4620 - Digital Signal Processing	14
5.36 ELEC4630 - Image Processing and Computer Vision	14
5.37 ENGG1100 - Professional Engineering	14
5.38 ENGG1300 - Introduction to Electrical Systems	14
5.39 ENGG1700 - Statics and Materials	14
5.40 ENGG4103 - Engineering Asset Management	14
5.41 ENGG4900 - Professional Practice and the Business Environment	14
5.42 ENGG7302 - Advanced Computational Techniques in Engineering	14
5.43 ENGG7811 - Research Methods	14
5.44 ENGY4000 - Energy Systems	14
5.45 FIRE3700 - Introduction to Fire Safety Engineering	14
5.46 INFS1200 - Introduction to Information Systems	14
5.47 INFS2200 - Relational Database Systems	14
5.48 INFS3208 - Cloud Computing	14
5.49 INFS4203 - Data Mining	14
5.50 MATE4302 - Electrochemistry and Corrosion	14
5.51 MATE7013 - Advanced Manufacturing	14
5.52 MATE7014 - Advanced Materials Characterization	14
5.53 MATE7015 - Additive Manufacturing	14
5.54 MATE7016 - Materials for Energy Conversion and Storage	14
5.55 MATH1051 - Calculus & Linear Algebra I	14
5.56 MATH1052 - Multivariate Calculus & Ordinary Differential Equations	14
5.57 MATH1071 - Advanced Calculus & Linear Algebra I	14
5.58 MATH1072 - Advanced Multivariate Calculus & Ordinary Differential Equations	14
5.59 MATH2001 - Calculus & Linear Algebra II	14
5.60 MATH2010 - Analysis of Ordinary Differential Equations	14
5.61 MATH3202 - Operations Research & Mathematical Planning	14
5.62 MECH2100 - Machine Element Design	14
5.63 MECH2210 - Intermediate Mechanical & Space Dynamics	14
5.64 MECH2300 - Structures & Materials	14
5.65 MECH3200 - Advanced Dynamics and Vibrations	14
5.66 MECH3250 - Engineering Acoustics	14
5.67 MECH3301 - Materials Selection	14

5.68	MECH3780 - Computational Mechanics	14
5.69	MECH4304 - Net Shape Manufacturing	14
5.70	MECH4950 - Advanced Manufacturing in Practice	14
5.71	MECH7101 - Design of Experiments	14
5.72	METR2800 - Mechatronic System Design Project I	14
5.73	METR3100 - Control System Implementation	14
5.74	METR4201 - Control Engineering 1	14
5.75	METR4202 - Robotics & Automation	14
5.76	METR4810 - Mechatronic System Design Project II	14
5.77	METR4911 - Thesis/Design Project	14
5.78	METR4912 - Thesis/Design Project	14
5.79	METR6203 - Control Engineering 2	14
5.80	MINE3110 - Integrated Orebody Knowledge	14
5.81	MINE3122 - Mining Systems	14
5.82	MINE3123 - Mine Planning	14
5.83	MINE3129 - Applied Mining Geomechanics	14
5.84	MINE4124 - Hard Rock Mine Design & Feasibility	14
5.85	MINE4129 - Mine Process Optimisation	14
5.86	STAT2003 - Mathematical Probability	14
5.87	STAT2004 - Statistical Modelling & Analysis	14
5.88	STAT2201 - Analysis of Engineering & Scientific Data	14
5.89	TIMS3309 - Technology and Innovation Management	14
6	Sponsors	15
7	Acknowledgments	16



Introduction

The 2023 UQ MARS Subject Guide has been created to guide all MARS members through their degree. This is a comprehensive guide that will present suggested program structures, enrolment plans, course profiles, and offer the chance to inform students of the specific pathways available within Mechatronics Engineering. We will aim to give specialised advice from our Exec team and various UQ MARS Alumni regarding study advice, course selection and general career advice.

The **UQ Mechatronics and Robotics Society** is also committed to not just Mechatronics Engineering students, but also various student engineers studying in adjacent fields; This includes Electrical, Mechanical, Computer, Software specialisations, as well as people in similar degrees such as Computer Science and I.T.

The guide will be divided into the following sections:

The **Recommended Enrolment Plan** is a template made by the MARS execs to provide a simple enrolment plan and leaves rooms for electives as desired.

Course Reviews and Advice contains specific details and advice for courses required in the BE(Hons) in Mechatronic Engineering and the BE/ME programs, alongside some courses in the Computer Engineering Major; as a lot of our members take these as electives.

About MARS



Membership



Recommended Enrolment Plan

We understand that it can be confusing and/or time consuming to plan out how to best structure the courses in your program. To make the process as simple as possible, we've provided a recommended enrolment plan for the Mechatronics course plans available at UQ. Please note that this is just a suggestion, and you may need to adjust the plan to account for the electives that you choose.

Bachelor of Engineering (Honours)

Program Structure

First Year				
Semester 1	MATH1051 or MATH1071	ENGG1100	CSSE1001	ELECTIVE
Semester 2	MATH1052 or MATH1072	ENGG1300	ENGG1700	CSSE1001

Second Year					
Semester 1	MATH2001	MECH2300	ELEC2300	MATH2010	STAT2201
Semester 2	MECH2100	MECH2210	ELEC2004	METR2800	

Third Year				
Semester 1	METR3100	MAJOR	MAJOR	MAJOR
Semester 2	METR4810	MAJOR	MAJOR	MAJOR

Fourth Year				
Semester 1	METR4201	METR4202	MAJOR	MAJOR
Semester 2	ENGG4900	METR4911 or METR4212		ELECTIVE



Major Options

Within the Bachelor of Engineering (Honours) Mechatronics specialisation, there are 2 majors to choose from:

- Computer Engineering
- Mining Engineering

Computer Engineering

To complete the computer engineering major under mechatronics, you must take the following 8 courses:

- | | | |
|------------|------------|------------|
| • COMP3506 | • CSSE3010 | • CSSE4010 |
| • CSSE2002 | • ELEC3004 | • CSSE4011 |
| • CSSE2310 | • MECH3200 | |

Mining Engineering

To complete the mining engineering major under mechatronics, you must take the following 8 courses:

- | | | |
|------------|------------|------------|
| • ELEC3004 | • MINE3122 | • MINE4124 |
| • MECH2300 | • MINE3123 | • MINE4129 |
| • MINE3110 | • MINE3129 | |

Minor Options

Within the Bachelor of Engineering (Honours) Mechatronics specialisation, there are 3 minors to choose from. Each minor pathway consists of a 4 course minor, plus the following 4 courses:

- | | |
|------------|------------|
| • ELEC2400 | • MECH3200 |
| • ELEC3004 | • METR6203 |

Data Science Minor

The data science minor consists of both:

- | | |
|------------|------------|
| • DATA2001 | • INFS1200 |
|------------|------------|

plus two of:

- | | | |
|------------|------------|------------|
| • COMP4702 | • INFS3208 | • STAT2003 |
| • INFS2200 | • INFS4203 | • STAT2004 |



Computing Minor

The computing minor consists of both:

- CSSE2002
- COMP3506

plus two of:

- COMP4702
- COSC3500
- MATH3202
- COSC2500
- INFS1200
- COSC3000
- INFS3208

Design Minor

The design minor consists of:

- DSGN1500

plus three of:

- DSGN1100
- DSGN2100
- DSGN3100
- DSGN1200
- DSGN2200

Open Major

The open major pathway consists of the following 4 courses:

- ELEC2400
- MECH3200
- ELEC3004
- METR6203

plus four courses consisting of at least two of the following:

- AERO4300
- CSSE4010
- ENGG4103
- AERO4450
- CSSE4011
- ENGY4000
- AERO4470
- ELEC3100
- MECH3301
- AERO4800
- ELEC3310
- MECH3250
- COMP3702
- ELEC4310
- MECH4304
- COMP3710
- ELEC4410
- MECH4950
- COMP4702
- ELEC4620
- TIMS3309
- CSSE3010
- ELEC4630

Bachelor of Engineering (Honours) and Master of Engineering

Program Structure

First Year				
Semester 1	MATH1051 or MATH1071	ENGG1100	CSSE1001	ELECTIVE
Semester 2	MATH1052 or MATH1072	ENGG1300	ENGG1700	CSSE2010

Second Year					
Semester 1	MATH2001	MECH2300	ELEC2300	MATH2010	STAT2201
Semester 2	MECH2100	MECH2210	ELEC2004	METR2800	

Third Year				
Semester 1	METR3100	ELEC2400	ELEC3004	METR4201
Semester 2	METR4810	MECH3200	ADVANCED	ADVANCED

Fourth Year				
Semester 1	METR4202	ADVANCED	ADVANCED	ELECTIVE
Semester 2	ENGG4900	METR6203	ADVANCED	ELECTIVE

Fifth Year			
Semester 1	ENGG7291		
Semester 2	ENGG7701	ADVANCED or MASTERS	MASTERS



Advanced Electives

As part of the BEME program, you must take between five and seven of the following courses:

- | | | |
|------------|------------|------------|
| • AERO4300 | • CSSE4011 | • FIRE3700 |
| • AERO4450 | • ELEC3100 | • MATE4302 |
| • AERO4470 | • ELEC3310 | • MECH3301 |
| • AERO4800 | • ELEC4310 | • MECH3250 |
| • COMP3702 | • ELEC4410 | • MECH4304 |
| • COMP3710 | • ELEC4620 | • MECH4950 |
| • COMP4702 | • ELEC4630 | • TIMS3309 |
| • CSSE3010 | • ENGG4103 | |
| • CSSE4010 | • ENGY4000 | |

Masters Electives

As part of the BEME program, you must take between two and three of the following courses:

- | | | |
|------------|------------|------------|
| • CSSE7610 | • MATE7013 | • MATE7016 |
| • ENGG7302 | • MATE7014 | • MECH7101 |
| • ENGG7811 | • MATE7015 | |



Electives

If you are undertaking another degree but are still interested in the field of mechatronics, there are some options available to you.

Electrical Engineering

If you are more interested in the electrical systems of mechatronics and robotics, there are a plethora of electives you can take as an Electrical Engineering student.

- METR3100
- ELEC4630
- METR6203
- COMP3702
- COMP4702
- COMP3710
- METR4202

Mechanical Engineering

If you are more interested in the mechanical systems and physical properties of mechatronics and robotics, there are a wide selection of potential electives.

- MECH2700
- MECH3780
- AERO4800
- METR3100
- METR4202
- MECH4950

Software Engineering

The most appropriate electives you could take as a Software Engineering student interested in Mechatronics is the following

- idk, put stuff here

Computer Science

The most appropriate electives you could take as a Computer Science student interested in Mechatronics is the following

- ENGG1300
- CSSE2310

- COMP3702
- COMP3710

- COMP4702





Course Profiles

AERO4300 - Aerospace Composites

AERO4450 - Aerospace Propulsion

AERO4470 - Hypersonics

AERO4800 - Space Engineering

COMP3506 - Algorithms & Data Structures

COMP3702 - Artificial Intelligence

COMP3710 - Pattern Recognition and Analysis

COMP4702 - Machine Learning

COSC2500 - Numerical Methods in Computational Science

COSC3000 - Visualization, Computer Graphics & Data Analysis

COSC3500 - High-Performance Computing

CSSE1001 - Introduction to Software Engi-





Sponsors



Acknowledgments

