

University of Plymouth

Faculty of Science and Engineering

School of Computing Electronics and Mathematics

Programme Specification

MSc Robotics

September Intake: 2558

January Intake: 7422

Approved from:
September 2022

1. MSc Robotics

Final award title: MSc Robotics

Level 7 Intermediate award title(s)

PgCert award requires a minimum of 60 credits

PgDip award requires a minimum of 120 credits

UCAS code – n/a

JACS code – H670

2. Awarding Institution: University of Plymouth

Teaching institution(s): University of Plymouth

3. Accrediting body: The IET: The Institution of Engineering and Technology

Summary of specific conditions/regulations:

A high fraction of assessment through exams / in-class test, including open problem-solving questions.

Date of re-accreditation: 2019 with a monitoring review in 2017/18.

4. Distinctive Features of the Programme and the Student Experience

The programme includes a mix of topics leading to careers in academic and industry. Semester 1 covers industrial robotic manipulators, control, software engineering and sensors and actuators. Semester 2, covers research results in artificial vision, autonomy, human-robot interaction, speech interfaces and the design of cognitive systems. The project work, in semester 3, will allow the student to explore robotic solutions to current problems in research, industry and society.

Teaching is underpinned by some of the Faculty of Science and Environment's major research. This includes for example its Centre for Robotic and Neural Systems (CRNS) and its Marine and Industrial Dynamic Analysis (MIDAS) Research Groups. CRNS and MIDAS staffs have contacts with major UK robotics companies.

5. Relevant QAA Subject Benchmark Group(s)

QAA Subject benchmark: **Engineering**, Computing

The programme follows the **IET UK-SPEC** learning outcomes and integrates those not fully specified with additional QAA learning outcomes (e.g. Key and Transferable skills).

6. Programme Structure

September start

Timings	Modules			
September -> January	AINT516Z Topics in Advanced Intelligent Robotics	ROCO508Z Intelligent Sensors and Control for Autonomous Systems	SOFT564Z Software Engineering for Distributed and Interactive Systems	PROJ518 MSc Dissertation and Research Skills
	13 Weeks 20 credits	13 Weeks 20 credits	13 Weeks 20 credits	
15 weeks	Guided Independent Study / Exams / Assessment			
	2 Weeks			
January -> June	ROCO506Z Science and Technology of Autonomous Vehicles	ROCO507Z Advanced Robot Design and Prototyping	AINT515Z Artificial Vision and Deep Learning	All Year 60 credits
	13 Weeks 20 credits	13 Weeks 20 credits	13 Weeks 20 credits	
15 weeks	Guided Independent Study / Exams / Assessment			
	2 Weeks			
June -> September	Work on dissertation until hand in date through the summer Submit September			

Table 1: Programme Structure MSc Robotics – September start

January start

Timings	Modules			
January -> June	ROCO506Z Science and Technology of Autonomous Vehicles	ROCO507Z Advanced Robot Design and Prototyping	AINT515Z Artificial Vision and Deep Learning	PROJ519 MSc Dissertation and Research Skills
	13 Weeks 20 credits	13 Weeks 20 credits	13 Weeks 20 credits	
15 weeks	Guided Independent Study / Exams / Assessment			
	2 Weeks			
Summer June -> September	Work on dissertation - Submit January			
September -> January	AINT516Z Topics in Advanced Intelligent Robotics	ROCO508Z Intelligent Sensors and Control for Autonomous Systems	SOFT564Z Software Engineering for Distributed and Interactive Systems	All Year 60 credits
	13 Weeks 20 credits	13 Weeks 20 credits	13 Weeks 20 credits	
15 weeks	Guided Independent Study / Exams / Assessment			
	2 Weeks			

Table 2: Programme Structure MSc Robotics – January start

The one-year programme (Table 1 – September start, Table 2 – January start) consists of 180 credits of study at Level 7 and will require students to study over two semesters and the summer.

Full-time students are normally expected to complete the programme in 12 months and part-time students within 24 months. Part-time study is allowed provided a minimum of 60 credits is studied in any one academic year and that the dissertation project is completed in a single academic year.

7. Programme Aims

The School of Computing Electronics and Mathematics shares the values of the University and supports its mission through the provision of a range of courses relevant to the theory and practice of robotics. Namely:

1. To be informative, challenging and establish a knowledge base suitable for a future career in an engineering based industry.
2. To give students with a variety of entry qualifications an opportunity to realise their potential.
3. To enrich curriculum content and teaching quality through the professional and/or research expertise of staff and industrial links.
4. To encourage and support students whilst they develop and apply technical and generic skills that will facilitate life-long learning and continuing professional development.
5. To produce graduates and postgraduates who can make a significant contribution to their professional field or business.

This MSc programme specifically aims:

1. To produce postgraduates with an awareness of the current limits of knowledge in robotics and with the ability to evaluate critically current research and advanced scholarship in robotics.
2. To produce postgraduates who recognise the technical complexity and systems nature of robotics, in addition to its human and socio-economic dimension communicated through a series of invited lectures.
3. To produce postgraduates with the ability to extend first principles and apply creatively a range of skills to the solution of unique design and control robotics problems.
4. To provide postgraduates with a specialist understanding of techniques applicable in robotics, and a depth and breadth of both knowledge and skills sufficient to enable them to work in their chosen specialist subject as well as related engineering areas.

8. Programme Intended Learning Outcomes

On successful completion graduates should have developed:

8.1 Knowledge and understanding

1. a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of robotics;
2. a comprehensive understanding of techniques applicable to their own research or advanced scholarship in robotics;
3. originality in the application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in robotics;

8.2 Cognitive and intellectual skills

1. the ability to deal with complex robotics problems both systematically and creatively,
2. the ability to make sound judgements in the absence of complete data,
3. the ability to plan, conduct and report on a programme of research,
4. the ability to evaluate designs, processes or products and make improvements.
5. the ability to evaluate critically current research and advanced scholarship in robotics; and to evaluate methodologies and develop critiques of them and, where appropriate, to propose new hypotheses.

8.3 Key and transferable skills

1. the ability to communicate effectively to specialist and non-specialist audiences;
2. the ability to demonstrate self-direction and originality in tackling and solving robotics problems, and act autonomously in managing resources and time at a professional level;
3. the ability to continue to advance their knowledge and understanding of robotics, and to develop new skills to a high level;
4. the ability to work in a team

8.4 Employment related skills

Qualities and transferable skills necessary for employment as a roboticist requiring:

1. the exercise of initiative and personal responsibility;
2. a systems approach to decision-making in complex and unpredictable situations;
3. an independent learning ability required for continuing professional development.

8.5 Practical skills

1. the ability to safely plan and execute a series of laboratory/workshop experiments requiring:
 - the generation of data
 - the analysis of results
 - effective literature research
 - the production of technical reports and presentations
2. the ability to use a range of computational tools and packages
3. the ability to use a range of specialist equipment.

9. Admissions Criteria, including APCL, APEL and DAS arrangements

A minimum of a lower second class honours degree (2.2) in a technical subject such as Robotics, Computing, Engineering (Mechanical / Electrical/ Electronic), Physics or Mathematics.

Students with advanced standing who can evidence an academic ability to a similar level may also be considered. All applicants should possess a minimum of grade C in English Language at GCSE level or minimum score of 6.5 in IELTS.

The following are also required: a sound understanding of mathematics (A level), basic skills in electrical engineering, basic knowledge of computer hardware and operating systems, familiarity with a programming language such as C, C++, Java or similar (refresher courses and support is available in these areas, but we need to know any support needs in advance).

APCL and APEL will be handled using standard university guidelines.

The admission and assessment of students with disabilities will be considered on a case-by-case basis, in consultation with the Disability Assist Services (DAS).

10. Progression criteria for Final and Intermediate Awards

The MSc Robotics programme generally follows the University's Regulatory Framework for Taught Postgraduate Awards.

Post Graduate Certificate (PgCert)	Requires the successful completion of modules worth 60 credits at level 7
Post Graduate Diploma (PgDip)	Requires the successful completion of modules worth 120 credits at level 7.
Master of Science degree (MSc)	A Master's degree will be awarded to a student who has successfully completed the appropriate modules worth a minimum of 180 credits.
Master of Science degree with Merit (MSc with Merit)	A student will be awarded a Master's degree with Merit provided that s/he has achieved a credit-weighted average mark of 60% or above across all modules (including the dissertation/major project), and provided that the mark for the dissertation/major project is not less than 50%.
Master of Science degree with Distinction (MSc with Distinction)	A student will be awarded a Master's degree with Distinction provided that s/he has achieved a credit-weighted average mark of 70% or above across all modules (including the dissertation/major project), and provided that the mark for the dissertation/major project module is not less than 60%.

Table 2: Criteria for Final and Intermediate Postgraduate Awards

Table 3 shows the requirements for progression to final and intermediate awards, including the award of the MSc degree with merit or distinction.

Successful completion of a module:

- The pass mark for a module at Level 7 is 50%.
- To pass a module requires a student to achieve at least 40% in both the exam and coursework elements and at least 50% in the overall module mark, or 50% overall if a coursework only module.

The maximum period of registration allowed will be:

- Three years.
- Five years for part-time students.

11. Exceptions to Regulations

To meet IET accreditation requirements, to pass a module students must achieve at least 40% in both the exam and coursework elements and at least 50% in the overall module mark, or 50% overall if a coursework only module.

12. Transitional Arrangements

13. Mapping and Appendices:

13.1. ILO's against Modules Mapping

A. Knowledge and Understanding		Modules
1. a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of robotics;	1	ROCO508Z, SOFT564Z, AINT515Z, ROCO506Z, ROCO507Z
2. a comprehensive understanding of techniques applicable to their own research or advanced scholarship in robotics;	1,2, 4	ROCO508Z, AINT515Z, SOFT564Z, AINT516Z, ROCO506Z, AINT515Z, ROCO507Z, PROJ518
3. originality in the application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in robotics;	3,5	PROJ518, AINT515Z, SOFT564Z, ROCO508Z, AINT516Z, ROCO506Z,

B. Cognitive/Intellectual Skills		
1. the ability to analyse and solve complex robotics problems both systematically and creatively,	3,4	SOFT564Z, ROCO508Z, AINT515Z, PROJ518
2. the ability to make sound judgements in the absence of complete data,	3,4	ROCO508Z, AINT516Z, ROCO506Z, AINT515Z.
3. the ability to plan, conduct and report a programme of original research,	4,5	PROJ518
4. the ability to evaluate designs, processes or products and make improvements.	1,3	PROJ518, SOFT564Z, ROCO508Z, AINT516Z, ROCO506Z, AINT515Z, ROCO507Z
5. the ability to evaluate critically current research and advanced scholarship in robotics; and to evaluate methodologies and, where appropriate, to propose new hypotheses	1,3, 5	PROJ518

C. Key/Transferable skills		
1. the ability to communicate effectively to specialist and non-specialist audiences;	4,5	PROJ518
2. the ability to demonstrate self-direction and originality in tackling and solving robotics problems, and act autonomously managing resources and time at a professional level;	4,5	PROJ518, AINT515Z, SOFT564Z, AINT516Z, AINT515Z, ROCO 507Z
3. the ability to continue to advance their knowledge and understanding of robotics, and to develop new skills to a high level;	4,5	PROJ518
4. the ability to work effectively in a team	4	AIN516Z, ROCO508Z

D. Employment related skills		
1. the exercise of initiative and personal responsibility;	4,5	PROJ518
2. a systems approach to decision-making in complex and unpredictable situations;	2,3,4,5	ROCO506Z, SOFT564Z.
3. the independent learning ability required for continuing professional development	4,5	PROJ518

E. Practical Skills		
1. The ability to safely plan and execute a series of laboratory/workshop experiments requiring: <ul style="list-style-type: none"> • the generation of data • the analysis of results • effective literature research • the production of technical reports and presentations 	3,4,5	PROJ518, ROCO508Z,
2. The ability to use a range of computational tools and packages	3,4,5	ROCO508Z, SOFT564Z, AINT515Z, AINT516Z, ROCO506Z, ROCO507Z
3. The ability to use a range of specialist equipment	3,4,5	PROJ518 AINT516Z, ROCO507Z, AINT515Z, SOFT564Z

13.2 Assessment against Modules Mapping

Semester	Module	Subject	Credits	E1 (%)	C1 (%)	T1 (%)	P1 (%)	A1 P/F
S1	ROCO508Z	Fundamentals of Robot Manipulators	20		50	50		
S1	AIN516Z	Topics in Advanced Intelligent Robotics	20		50	50		
S1	SOFT564Z	Software Engineering for Distributed and Interactive Systems	20		70	30		
S2	ROCO506Z	Science and Technology of Autonomous Vehicles	20		50	50		
S2	ROCO507Z	Advanced Robot Design and Prototyping	20		50	50		
S2	AIN515Z	Artificial Vision and Deep Learning	20		50	50		
AY	PROJ518	MSc Dissertation and Research Skills	60		100			P/F

13.3 Skills against Modules Mapping
(see 13.1)

13.4 Appendices
None