Plymouth University

Faculty of Science and Engineering
School of Computing Electronics and Mathematics

Programme Specification

MRes Robotics (2559)

September 2016
1. **MRes Robotics**

   **Final award title**: MRes 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(ies)**: none

4. **Distinctive Features of the Programme and the Student Experience**

   The programme includes a mix of topics relevant to problem solving in academia and industry. The course includes topics on industrial robotic manipulators, control, software engineering and sensors and actuators. It also introduces research results in artificial vision, autonomy, human-robot interaction, speech interfaces and the design of cognitive systems. The extended project work allows the student to develop new solutions to current robotics 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**
This programme is offered as a one-year full-time course. This comprises 3 semesters of study and leads to the awards of Master of Research (MRes).

Students will study 4 out of the 6 modules in semester 1 and semester 2. The selection is to be agreed with the Programme Manager. In parallel, they will work on the initial part of their project that will be completed in Semester 3.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Module</th>
<th>Subject</th>
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<td>Sensors and Actuators</td>
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<td>MRes Project</td>
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<td>P/F</td>
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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 MRes 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.

5. To provide the opportunity to pursue a substantial, research led project in robotics.

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
A PgCert award requires a minimum of 60 credits
A PgDip award requires a minimum of 120 credits
11. Exceptions to Regulations
   None

12. Transitional Arrangements
   None
### 13. Mapping and Appendices:

#### 13.1. ILO’s against Modules Mapping

<table>
<thead>
<tr>
<th><strong>A. Knowledge and Understanding</strong></th>
<th><strong>Modules</strong></th>
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<td>1. a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of robotics;</td>
<td>1 MECH533, SOFT561, AINT513, AINT512, ROCO503</td>
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<td>2. a comprehensive understanding of techniques applicable to their own research or advanced scholarship in robotics;</td>
<td>1,2,4 MECH533, AINT513, SOFT561 AINT511,AINT512, AINT513 ROCO503, PROJ510</td>
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<td>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;</td>
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<th><strong>B. Cognitive/Intellectual Skills</strong></th>
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<tr>
<td>1. the ability to analyse and solve complex robotics problems both systematically and creatively;</td>
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<td>2. the ability to make sound judgements in the absence of complete data;</td>
<td>3,4 MECH533, ROCO503, AINT511, AINT512, AINT513</td>
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<td>3. the ability to plan, conduct and report a programme of original research;</td>
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<td>4. the ability to evaluate designs, processes or products and make improvements.</td>
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<td>5. the ability to evaluate critically current research and advanced scholarship in robotics; and to evaluate methodologies and, where appropriate, to propose new hypotheses</td>
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E. 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
   3,4,5 PROJ510, ROCO503, MECH533,

2. The ability to use a range of computational tools and packages
   3,4,5 MECH533, SOFT561, AINT513, AINT511, AINT512

3. The ability to use a range of specialist equipment
   3,4,5 PROJ510 AINT511, AINT512, AINT513, SOFT561

13.2 Assessment against Modules Mapping

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13.3 Skills against Modules Mapping
(see 13.1)

13.4 Appendices
None