A Programme specification
1. GENERAL INFORMATION

<table>
<thead>
<tr>
<th>Award</th>
<th>Programme Title</th>
<th>Duration</th>
<th>Mode of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSc</td>
<td>Applied Mathematics</td>
<td>1 year</td>
<td>Full time</td>
</tr>
<tr>
<td></td>
<td>Applied Mathematics with Industrial Modelling</td>
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<tr>
<td></td>
<td>Applied Mathematics with Numerical Analysis</td>
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<tr>
<td>PG Diploma</td>
<td>Applied Mathematics</td>
<td>1 year</td>
<td>Full time (Exit award only)</td>
</tr>
<tr>
<td>PG Certificate</td>
<td>Applied Mathematics</td>
<td>1 year</td>
<td>Full time (exit award only)</td>
</tr>
</tbody>
</table>

School  | School of Mathematics
Faculty  | Engineering and Physical Sciences
Awarding Institution  | University of Manchester
Programme Accreditation  | None
Relevant QAA benchmark(s)  | N/A at this level

2. AIMS OF THE PROGRAMME(S) (must include separate aims for PG Certificate and PG Diploma awards)

The programme aims to:

01. Teach general principles of applied and numerical mathematics to students who have a strong academic track record in a mathematically-based science or engineering discipline.

02. Provide sufficient breadth and depth of experience in applied mathematics that students will have significantly advanced their career prospects within the academic field (especially continuing with Ph.D. studies) and in specialised sectors of industry and commerce.

03. Equip students with sufficient knowledge of applied and computational mathematics that they will be able to apply their knowledge to at least one application area, whether through modelling or computation.

04. Provide an opportunity to engage in a research project.

3. INTENDED LEARNING OUTCOMES OF THE PROGRAMME(S) (must include separate outcomes for PG Certificate and PG Diploma awards)

A. Knowledge & Understanding

Students should (please delete as appropriate) be able to:

A1. Understand fundamental topics in applied mathematics, including physical and industrial modelling, underlying mathematical theory, numerical algorithms and computer programming and software issues.

A2. Have knowledge and understanding of selected advanced topics in computational applied mathematics, to provide a deeper understanding of some aspects of the subject.

A3. Appreciate the principles of research methods and practice.
**B. Intellectual Skills**

Students should *(please delete as appropriate)* be able to:

- **B1.** Utilise mathematical modelling skills.
- **B2.** Utilise computational mathematics skills.
- **B3.** Plan, conduct and report on a programme of original work for a dissertation.
- **B4.** Integrate and evaluate information from a variety of sources in the context of a written project/dissertation.
- **B5.**

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**C. Practical Skills**

Students should *(please delete as appropriate)* be able to:

- **C1.** Intelligently use mathematical software packages under Unix/Windows.
- **C2.** Design and write efficient, robust, reliable mathematical software to satisfy given requirements.
- **C3.** Produce written technical reports and prepare and present technical oral presentations.
### Learning & Teaching Processes

<table>
<thead>
<tr>
<th></th>
<th>Assessment</th>
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</thead>
<tbody>
<tr>
<td>Small group lecturing (C1, C2, C3)</td>
<td>Computer-based practical work (C1, C2, C3)</td>
</tr>
<tr>
<td>Supervised laboratory exercises (C1, C2)</td>
<td>Written projects (C1, C2)</td>
</tr>
<tr>
<td>Written projects and dissertation (C3)</td>
<td>Oral presentation (C3)</td>
</tr>
<tr>
<td>Written projects (C1, C2, C3)</td>
<td>Dissertation (C1, C2, C3)</td>
</tr>
</tbody>
</table>

### D. Transferable Skills and Personal Qualities

**Students will/should (please delete as appropriate) be able to:**

<p>| | |</p>
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<tbody>
<tr>
<td>D1.</td>
<td>Apply skills in computational applied mathematics.</td>
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<tr>
<td>D2.</td>
<td>Perform independent information acquisition and management.</td>
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<tr>
<td>D3.</td>
<td>Perform independent and efficient time management.</td>
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<tr>
<td>D4.</td>
<td>Communicate effectively in writing and in oral presentations.</td>
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<tr>
<td>D5.</td>
<td>Work effectively as a team member.</td>
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### Learning & Teaching Processes

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<thead>
<tr>
<th></th>
<th>Assessment</th>
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<tbody>
<tr>
<td>Small group lecturing (D1, D4)</td>
<td>Written examinations (D1, D4)</td>
</tr>
<tr>
<td>Supervised laboratory exercises (D3, D5)</td>
<td>Computer-based practical work (D2, D3, D5)</td>
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<tr>
<td>Written projects and dissertation (D1, D2, D3, D4)</td>
<td>Mathematical coursework (D1, D3, D4)</td>
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<tr>
<td>Written projects (D1, D2, D3, D4, D5)</td>
<td>Written projects (D1, D2, D3, D4, D5)</td>
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<tr>
<td>Oral presentation (D3, D4)</td>
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</tr>
<tr>
<td>Dissertation (D1, D2, D3, D4)</td>
<td>Dissertation (D1, D2, D3, D4)</td>
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</table>
4. THE STRUCTURE OF THE PROGRAMME(S)

Programme structure and credits

| Please indicate both compulsory units and optional units (including Choice of _ from _ ), as well as requirements for exit awards and any specified pathways. |
| Credits |
| Semester one/two: (taught across two semesters) |
| 15 credits core |
| Semester one: |
| 45 credits core |
| 15 credits optional |
| Semester two: |
| 15 credits core |
| 30 credits optional |
| Total taught: |
| 120 credits |

September: Introductory lectures, 1-day Unix course (0 credits), tour of John Rylands University Library (0 credits).

September-January: Students take the following compulsory courses:
- Scientific Computing (15 credits)
- Applied Dynamical Systems (15 credits)
- Transferable Skills for Applied Mathematicians (15 credits)
- Mathematical Methods (15 credits)

And one optional module from
- Numerical Linear Algebra (15 credits)
- Continuum Mechanics (15 credits)

Students registered for the with Industrial Modelling pathway must take Continuum Mechanics and those registered for the with Numerical Analysis pathway must take Numerical Linear Algebra.

January-May: Students take the following compulsory modules:
- Transferable Skills for Applied Mathematicians (continued from semester one; total 15 credits)
- PDEs: Theory and Practice (15 credits)

And two optional modules from
- Numerical Optimization and Inverse Problems (15 credits)
- Approximation Theory and Finite Element Analysis (15 credits)
- Transport Phenomena and Conservation Laws (15 credits)
- Stability Theory (15 credits)

Students registered for the with Industrial Modelling pathway must take Transport Phenomena and Conservation Laws and Stability Theory and those registered for the with Numerical Analysis pathway must take Numerical Optimization and Inverse Problems and Approximation Theory and Finite Element Analysis.

June--September: Students work on and write their dissertation.

5. STUDENT INDUCTION, SUPPORT AND DEVELOPMENT (in order to deliver the intended learning outcomes, including dissertation support and guidance)
THE UNIVERSITY OF MANCHESTER
Postgraduate Programme Specification

**September:** Students gain familiarity with Unix-based computer system and with the library facilities.

**September-January:** Students acquire knowledge of core areas of applied and computational mathematics and gain analytical, design and practical skills, enabling them to propose and implement solutions to a range of problems. They will also acquire a deeper understanding of selected areas of mathematics and computer science and become familiar with the technical typesetting system LATEX.

**January-May:** Students deepen their knowledge of applied and computational mathematics and choose a dissertation project. This project is begun at end of second semester and continues through to September.

**September:** The thesis is assessed by two internal examiners by report and moderated by one external examiner.
<table>
<thead>
<tr>
<th>Course Unit Title and Code</th>
<th>Knowledge &amp; Understanding</th>
<th>Intellectual Skills</th>
<th>Practical Skills</th>
<th>Transferable Skills &amp; Personal Qualities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Unit Title</strong></td>
<td><strong>A1</strong></td>
<td><strong>A2</strong></td>
<td><strong>B1</strong></td>
<td><strong>B2</strong></td>
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<tr>
<td>Numerical Linear Algebra</td>
<td>O</td>
<td>D</td>
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<tr>
<td>Scientific Computing</td>
<td>C</td>
<td>D</td>
<td>A</td>
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<td>Applied Dynamical Systems</td>
<td>C</td>
<td>D</td>
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<tr>
<td>Transferable Skills for Applied Mathematicians</td>
<td>C</td>
<td>D</td>
<td>A</td>
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<td>Mathematical Methods</td>
<td>C</td>
<td>D</td>
<td>A</td>
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<td>D</td>
<td>D</td>
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<td>PDEs Theory and Practice</td>
<td>C</td>
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<td>Dissertation</td>
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**Legend for cells**

- **D** = intended learning outcomes of the programme are taught or developed by students within this course unit
- **A** = intended learning outcomes of the programme are assessed within this course unit
- **C** = compulsory course unit
- **O** = optional course unit
7. CRITERIA FOR ADMISSION

Applicants should normally have a First or good Second Class Honours degree in Mathematics or a mathematically-based subject from a recognized university or an equivalent qualification. Students from outside the UK should be proficient in the use of the English language and should have a score of 6.5 in IELTS, or equivalent (e.g. 600 TOEFL or 250 TOEFL computer assessment).

8. PROGRESSION AND ASSESSMENT REGULATIONS

The programme will adhere to the Ordinances and Regulations for the Degree of Master, Postgraduate Diploma, and Postgraduate Certificate of the University of Manchester.

Role of External Examiner

One external Examiners will be appointed from the academic sector. The role of the External Examiners is to

- Approve examination programmes
- Review all examination scripts
- Act as a moderator of dissertations
- Attend board meetings and provide constructive feedback on student performance and course review

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