Faculty of Engineering, Computing and Mathematics
Expression of Interest for a Masters Course under the Future Framework

Name of proposed masters course: Mathematics and Statistics

Brief description and purpose (1-2 paragraphs)

This course will train students, with a solid mathematical background, in one of the mathematical disciplines (pure mathematics, applied mathematics or statistics) and deepen their understanding of mathematics in general, in order to prepare them to work in industry as well as in research.

The emphasis throughout the course is on problem solving and therefore research in a specific sub-discipline. Graduates in mathematics are rarely employed for their experience in a certain field but for their ability to understand, model and solve complex problems. With a strong research focus this course addresses these needs. But for Tomorrow’s complex problems we feel that just one area of expertise is not enough. Therefore the coursework component of this course is designed to give graduates a broad education in at least two of the discipline areas.

Anticipated entrance pathways or prerequisites

Students with a Mathematics and Statistics Major (or equivalent). Other mathematically intensive majors such as physics or engineering, and international students will be considered but may require level three of the Mathematics Major as a pathway.

Indicative units (not final)

Half of the coursework units will be core units (indicated by (c) in the table below). Specialisation is indicated with (s) and mathematical broadening units by (b)

<table>
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<th>Year 1</th>
<th>Year 2</th>
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<tbody>
<tr>
<td><strong>Semester 1</strong></td>
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<tr>
<td>Advanced Mathematics 1 (b,c)</td>
<td>Project</td>
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<tr>
<td>Specialisation 1 (s)</td>
<td>Project</td>
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<tr>
<td>Specialisation 2 (s)</td>
<td>Project</td>
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<tr>
<td>Scientific Computing and Communication (b,c)</td>
<td>Project</td>
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<tr>
<td><strong>Semester 2</strong></td>
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<tr>
<td>Project (s)</td>
<td>Advanced Mathematics 2 (b,c)</td>
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<tr>
<td>Project</td>
<td>Specialisation 3 or Non-Specialisation (s/b)</td>
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<td>Project</td>
<td>Non-Specialisation (b)</td>
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<tr>
<td>Project</td>
<td>Scientific publishing (c)</td>
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Details on the proposed units are given below in the section on Structure of the masters.

Proposed project size (if applicable)

There is one research project, being equivalent to 8 units (see above table).
**Structure of the masters (eg. students take all units, choose from electives, choose one of a number of streams, etc)**

Students take four core units and elect one specialisation area (Pure/Applied/Stats).

In their specialisation they can take up to three units, while the fourth unit has to be from outside their specialisation area. An additional unit outside this specialisation may be chosen in the fourth semester (level 5) if a student has chosen to only take two specialisation units. The specialisation units can be understood as streams, since each specialisation area will offer 3 units. Depending on enrolment numbers some of these units will be run as reading courses.

The core units will be run once per year. While this doesn’t allow mid-year entries, it ensures that the compulsory core units will have a high enrolment number.

The two Advanced Mathematics units expose students to mathematical ideas that every graduate in Mathematics should have seen and should be able to master.

The Scientific Computation and Communication unit introduces students to software packages commonly used in the discipline (LaTeX, GAP, R, Mathematica, etc.), fosters research competence by means of a literature review and, since the results of this review will be presented in a seminar, communication skills.

The Scientific Publishing unit is another language-rich unit teaching students to summarize their research theses as a paper-draft. Students will not only learn writing a mathematical research paper but also become familiar with all aspects of publishing (how to choose a journal, the peer-review process, the open access model, etc.).

**What content do you believe could be shared in common across a number of the Faculty’s masters courses (eg. project management, data collection and analysis, research skills, etc)**

Part of the units will be shared with the Quantitative Methods masters course. This includes part of the Scientific Computation and Communication unit as well as one unit in the Statistics specialisation. The School of Physics has indicated that they are interested in our Advanced Mathematics units. It is likely that they will make these units compulsory for their students, or at least strongly recommended.

**What content would be unique to this masters course?**

The three specialisation streams will be unique and also the two units on mathematical communication/writing.

**Is this masters course, or a variant, currently running?**

No, but most of the material will be based on currently running Honours units. As a consequence of the change in structure of the undergraduate degrees, the material in these units will be revised and tailored for the new audience.

**How soon do you believe the course could be mounted?**

2013.
Rationale: Who is the target audience? What resources are required? Why do you believe it (a) is important to run this programme, (b) can be resourced by staff in the School(s), and (c) will be viable?

We are targeting the following audiences:

1. Mathematics majors graduating from this or other Australian universities who wish to gain a sufficient specialisation in an area of mathematics and/or statistics in preparation for a PhD.

2. Graduates from other disciplines who enjoy problem solving and desire a deeper understanding of the mathematical foundations of their chosen area.

3. International students wishing to gain a masters degree from this University. Since the recent cessation of our old masters program we have had to turn down twenty applicants.

Resources required would be the standard educational resources for such courses, including lecture facilities, computer laboratories, hardware and software, and teaching staff. The majority of these are already available.

The importance of the program is clear. Mathematics underpins the foundations of all sciences and their applications (e.g. Engineering). Pure mathematics has helped build fast, secure communications systems, Applied mathematics enabled us to fly to the moon and enables us to rise to the many challenges of the world Today (e.g. climate change), and the enormous disciplines of Medicine and Business rely critically on Statistics. In many fields of endeavour there is a strong emphasis on teaching graduates how to find practical solutions. As Society is required more and more to understand and manage complex systems the question “So it works in practice but how does it work in theory?” becomes again relevant. Perhaps “how does it work in theory” is not so important in a particular application, but for future developments, policymaking and risk assessment it certainly is. By enabling graduates to be able to answer this question in a research and/or industrial environment we are not only strengthening UWA’s position as a research-intensive university but also contributing to the future of the Commonwealth.

With our current staff the School has sufficient resources for this course.

We believe that the course will be viable. In particular:

1. The previously stated interest of international students in this type of course.
2. Effective management of teaching (only a small number of specialised units, the core units taken by all students, and some perhaps shared with Physics).
3. The increasing need to understand, forecast and manage complex systems increases the demand for our graduates.

Contact person for the EOI
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Endorsement of Head of School(s)
Name(s): Date(s):