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November 1, 2018

To: Robert Stacey, Dean, College of Arts and Sciences
Suzanne Hawley, Divisional Dean of Natural Sciences, College of Arts and Sciences

From: Rebecca Aanerud, Interim Dean
Kima Cargill, Interim Associate Dean for Academic Affairs and Planning

RE: Review of the Department of Applied Mathematics (2017-2018)

This memorandum outlines the Graduate School's final recommendations from the Department of Applied Mathematics academic program review. Detailed comments on the review can be found in the documents that were part of the following formal review proceedings:

- Charge meeting between review committee and administrators (September 8, 2017)
- Self-Study (March 5, 2018)
- Site visit (April 19-20, 2018)
- Review committee report (May 8, 2018)
- Unit response to the report (May 14, 2018)
- Graduate School Council consideration of review (November 1, 2018)

The review committee consisted of:

Dennis Hartman, Professor, UW Department of Atmospheric Sciences (Committee Chair)
Thomas Quinn, Professor, UW Department of Astronomy
Mark Ablowitz, Professor, Department of Applied Mathematics, University of Colorado Boulder
Leah Edelstein-Keshet, Professor, Department of Mathematics, University of British Columbia

The Department of Applied Mathematics offers the following degrees: Bachelor of Science in Applied and Computational Mathematical Sciences, Master of Science in Applied Mathematics, Master of Science in Computational Finance and Risk Management, and Doctor of Philosophy. The Department also offers an Applied Mathematics minor.

Members of the Graduate School Council presented findings and recommendations to the full Council at its meeting on November 1, 2018. A summary of this report, composed by Graduate School Council Members, is attached to this document.

Graduate School Council Recommendations

The Graduate School Council commends the Department of Applied Mathematics on the strength of its programs, faculty and students. The Council recommends that the Department continue its work toward bringing diversity in faculty hiring.

The Council recommends the next review be conducted in 10 years (2027-2028).

We concur with the Council's recommendations.

cc: Mark Richards, Provost and Executive Vice President
Patricia Moy, Associate Vice Provost for Academic and Student Affairs, Office of the Provost
Janice DeCosmo, Associate Dean, Undergraduate Academic Affairs
Bernard Deconinck, Chair, Department of Applied Mathematics
Becky Corriell, Director, Academic Program Review & Strategy, the Graduate School
Academic unit Review Committee Members
Members of the Graduate School Council
GPSS President

Attachment

University of Washington │ Graduate Council

Degrees/Certificates Included in the Review:

- Bachelor of Science in Applied and Computational Math Sciences (ACMS,), an undergraduate major delivered jointly with Computer Science & Engineering, Mathematics, and Statistics
- Applied Mathematics Minor
- Master of Science in Applied Mathematics (AMath MS), delivered on campus and online
- Master of Science in Computational Finance and Risk Management (CFRM), delivered on campus and online
- PhD in Applied Mathematics

Program Strengths:

1. The reputation of the Department is very strong and is among the top in North America in terms of research leadership, training, and accomplishments. Faculty in the Department have substantial expertise in methodologies (e.g., analysis of ordinary and partial differential equations, applied probability, stochastic analysis, and optimization) that provide a platform for new application areas in mathematics that are of increasing importance to solving real-world problems in areas such as mathematical biology, data science, financial mathematics, nonlinear dynamics and waves, and others. Planned future focus areas rest on areas of current strength and provide a similar platform for growth.

2. The PhD program is exceptionally strong and extremely selective.

3. The Department operates innovative, and successful, Master's programs valued by and valuable to both students and industry. These offerings include a set of fee-based Master's programs that generate substantial revenue for the Department and the College. The Master's programs offer flexibility in format (on campus or online).

4. The Department provides strong service to the ACMS degree offering, a multidisciplinary Bachelor of Science degree offering of the College of Arts and Sciences.

Challenges and Risks:

1. Faculty in key areas have retired and/or are nearing retirement, and positions of retired faculty have not been replaced. This leaves gaps in several key areas, most notably in numerical/ computational mathematics.

2. The Department is not meeting (its own at UW) goals for gender or under-represented minority diversity among faculty, though it does very well in gender

diversity in its graduate student populations.

3. The Review Committee noted that career and academic advising for students in the Applied Mathematics MS program is not at a level comparable to advising in the PhD program or the fee-based CFRM program.

4. The ACMS program faces several throughput bottlenecks (e.g., presence of a required but limited enrollment project course, lack of TA support) and must turn away many well-qualified applicants.

5. Students enrolled in ACMS are "homeless" in that no one department in this multidisciplinary offering owns their student experience. Due to this structure, co-curricular and extra-curricular development and social experiences are limited, and students miss out on these aspects of academic development. Students also state that some courses repeat material previously taught in other courses, and they do not know whom to speak with about the perceived redundancy.

6. Office space and conference room facilities, while adequate in size, are inadequate in terms of quality to Master's students. Facilities overall are not ADA compliant and present a substantial risk in the event of a major earthquake due to the type of construction. A large attic space is currently unused (the Department could convert this area to usable space with requisite financial investment).

7. The Review Committee noted that when the department hires TAs to support tuition-based courses using revenue from the fee-based programs (CFRM and Applied Math MS Online), the department is required to pay both tuition and stipend. Conversely, when TAs are hired using GOF funds, the university pays the tuition waiver for these TAs. Thus, the Review Committee recommended that this be remedied, although this change may be outside of the purview of the Department of Applied Mathematics.

Areas of Concurrence/Disagreement:

1. The program and Review Committee exhibit broad general agreement across most program strengths and challenges.

2. The Department and the Review Committee agree that the Department is well-positioned to introduce an undergraduate major of its own (a new AMath major) to provide students with broader access to STEM careers. Based upon discussions at the Exit Meeting, they may disagree about the financial viability of such an offering absent intra-college resource commitments for additional funds that would flow to the Department.

Graduate School Council Recommendations:

The Graduate School Council recommends continuing status for all UW Applied Math degree programs with next review taking place in 10 years.