

UCC Program Review Committee - Summary of Review

Program – Department of Mathematics

This program includes the following degrees, minors, and certificates:

- Mathematics (Ph.D.)
- Mathematics (M.S.)
- Mathematics (B.S.)
- Mathematics (B.A.)
- Applied Mathematics (B.S.)
- Actuarial Science (B.S.)
- Mathematical Statistics (B.S.)
- Honors Tutorial College Mathematics (B.S.)
- Mathematics Minor (OR3101)

Recommendation

This program is found to be viable. See report for commendations, concerns, and recommendations.

Date of last review – AY 2007

Date of this review – AY 2018

This review has been sent to school director and the dean, their joint response is attached.

Graduate Council reviewed the report and had no additional comment.

**Ohio University Department of Mathematics
Seven-Year Review
Report of the Review Committee**

**(Professors Roycroft, Jeng, and Reader– internal Reviewers and Professor Donald B. White–
External Reviewer)**

Review Conducted April 19 & 20, 2018

Report Date: April 30, 2018

Executive Summary

This report summarizes the Seven-Year Review of Ohio University's Department of Mathematics. The review was conducted on April 19th and 20th on the Athens campus. The review team consisted of three internal reviewers (Associate Professor Fuh-Cherng Jeng, Ph.D., Associate Professor Bill Reader, M.A., and Professor Trevor Roycroft, Ph.D.) and one external reviewer (Professor Donald B. White, Ph.D., Professor and Chair, Department of Mathematics and Statistics, University of Toledo).

The committee is of the opinion that the programs supported by the Department of Mathematics, are viable, and show evidence of excellence. However, the committee also notes negative effects of the ongoing environment of declining budgets at Ohio University.

The review committee finds that the program is achieving excellence in fulfilling its mission:

- The review committee finds that the RSCA is appropriate for the program, and finds examples of excellence that demonstrate the talent, training and commitment of the faculty. The review committee found evidence that Group I faculty are active researchers. The committee also found evidence that the program places appropriate emphasis on teaching.
- Service contributions from the department appear appropriate with members of the faculty having served on or currently serving on various department, college and university committees. Faculty also provides appropriate service to the profession through referee service, conference session organization, and other activities.
- The department is shouldering a substantial role in teaching service to the university in the form of a variety of mathematics courses that are essential to a wide array of programs. The department makes a strong contribution to the University's general education mission, and successfully serves other programs' needs for foundational education in mathematics. The review committee found that both Group I and Group II faculty were committed to the teaching mission of the department.
- One area of concern relates to graduation rates. The review committee finds that the department has experienced significant declines in both the four and six-year graduation

rates, with the four-year and six-year rates for the most recent cohorts being 35% and 48% respectively.

The committee wishes to applaud the department faculty (both Group I and II) for their work in serving their students, and contributing to the mission of the university. Faculty are active researchers, students appear to be engaged with their academic experience, and the faculty appear to be collegial.

Observations on the program as a whole:

- a. Is the current number and distribution of faculty sufficient to carry out the broad overall mission of the Department (Teaching; Research, Scholarship and Creative Activity; Service)?**

The review committee finds that the current number of faculty is appropriate for the department's current mission, however, the decline in Group I faculty is a concern. Undergraduate credit hours taught by Group I faculty has declined by 26% during the review period, with a corresponding increase of 73% of undergraduate credit hours taught by Group II faculty. However, the review committee found evidence that teaching is good, that Group I faculty are active researchers, and that reasonable levels of service is being provided. Based on discussions with both Group I and Group II faculty, the review committee believes that faculty workload is reasonable.

- b. Is the level of the Department's RSCA appropriate for the program given the size of the faculty and the resources available to the Department? Is the Department's level of external funding at an appropriate level?**

The review committee finds that the RSCA is appropriate for the program, and finds examples of excellence that demonstrate the commitment of the faculty. The review committee found evidence that Group I faculty are active researchers. In addition, the Center for Ring Theory stands out as a unique element of excellence, which brings global interest to research activities at Ohio University.

The review committee finds that the department's policy of a 40% workload devoted to research for Group I faculty is appropriate, and evidence provided in the Self Study indicates that Group I faculty are successfully publishing, although some faculty are more active than others. Given budget constraints, the Department appears to be doing its best to offer appropriate incentives to encourage high-quality research. Departmental support for travel is limited to \$1,500 for Group I and \$500 for Group II faculty. Those amounts limit the ability of faculty to attend more than one conference per year. Start-up funds for new faculty appear to be adequate, but the need for new faculty to procure their own computer from those funds cuts into their effectiveness.

c. Is the level of service, outside of teaching, appropriate for the program given its size and the role that it plays in the University and broader communities it interacts with? Is the Department able to fulfill its service mission?

Service contributions from the department appear appropriate. Faculty in the department are engaged in typical service associated with College and University committees, and service to the profession. Service to the profession includes referee service, editorships of journals, the organization of conferences, involvement in governance of professional societies, reviewing grants, or taking on roles in statewide and national committees.

It is also notable that some of the department's faculty have been involved with supporting math education in local communities. The department works with the Southeast Ohio Math Teachers' Circle, which they initiated in Spring 2013 and was funded initially by an ODHE Improving Teacher Quality Grant. The department has also been involved with a "Math League," which is targeted at children aged 11-14. The Math Circle affiliated with the Navajo tribe is unique and quite worthy of note.

d. Does the Department have an appropriate level of financial resources, staff, physical facilities, library resources, and technology to fulfill its mission?

The review committee found evidence that the extended period of budget austerity at Ohio University appears to be weighing on the department. The committee notes that the department does not provide office computer equipment directly to incoming faculty, who are required to take computer costs out of their start-up funds. Travel funding is bare bones. Graduate student funding, coupled with inflationary costs such as health care, housing, food, etc., all but assures a difficult financial situation for those students. The department is housed in Morton Hall, which, like many buildings on the Athens Campus, has deferred-maintenance issues. The space is in fair condition, but apparently has significant problems with climate control.

The department has three full time positions devoted to general administrative support; that level of administrative resource also appears to be appropriate, and both faculty and students offered high praise for the efforts of the administrative staff. The department depends on shared technical support, and while support has been weak in the past, the level of support has improved. The College may want to consider expanding financial and technical support resources.

Undergraduate Program:

a. Is the Department fulfilling its service role, adequately preparing non-majors for future coursework and/or satisfying the needs for general education?

Yes, this department more than adequately prepares non-majors for future coursework and satisfies the needs for general education. Mathematics faculty and graduate students teach required courses for the general education Tier 1 Quantitative Skills requirement, and provide service to other disciplines (i.e. Physics, Engineering) through the delivery of a variety of math

courses required in the sciences, social sciences, education, and business disciplines.

b. Is the program attracting majors likely to succeed in the program? Is the number of majors appropriate for the program? Is the program attracting a diverse group of students?

The program appears to be attracting good students, but faculty report increased variation in student quality over time. Students reported that course availability is consistent with their ability to make progress toward graduation in a reasonable fashion, however, those statements may not be consistent with graduation rates. Students also report that faculty are accessible, and that advising is generally supportive.

According to the self-study report the split between male and female students is about 60/40. Ethnicity is predominantly white, but demographics are similar to the overall Ohio University student body. The department indicates that it has participated in college and university efforts to increase diversity.

During the period of this seven-year review, the first-year student retention rate in Mathematics shows some fluctuation, but is similar to the overall university's rate.

According to the self-study, graduation rates in Mathematics have declined significantly over time. For the cohort entering in Fall 2009, the four- and six-year rates are 35% and 48% respectively, as compared with 65% and 88% for the 2004 cohort. While some decline may have been expected due the transition from quarters to semester, such a decline appears to be outside of the experience in the overall College of Arts and Sciences, which exhibited a 58% six-year rate for the 2004 cohort, and a 59% six-year rate for the 2009 cohort.

c. Does the undergraduate curriculum provide majors with an adequate background to pursue discipline-related careers or graduate work following graduation?

According to faculty and student interviews, undergraduates are successful in either finding employment in the job market and/or acceptance into graduate programs. The Actuarial Science program appears to be a strong component of the undergraduate program; however, there may be issues with students being able to complete more than one exam prior to graduation. The absence of major employers in the Athens area also works against the ability of the department to place students in internships. Undergraduate students expressed some concern regarding the use of yoked classes (combined UG/graduate courses) and noted that graduate students in the classes sometimes dominate the interactive elements of such courses. The department may want to explore new methods to better engage undergraduate students in yoked classes, or to advise graduate students to be more accommodating of their undergraduate classmates. Importantly, if the same syllabus was used for a yoked class, undergraduate and graduate students should receive differential loads of homework assignments and/or have different expectations for their learning outcome measurements.

d. Are the resources and the number of and distribution of faculty sufficient to support the undergraduate program?

Both the faculty and the department chair stated that they felt that number of faculty is sufficient to cover all the courses (balanced teaching loads and appropriate faculty for the courses content). One concern may be the shift in the number of Group I vs. Group II faculty (26 and three in '06-'07 to 22 and seven in '17-'18), which can decrease the department's overall productivity in terms of research and graduate-student teaching/advising.

e. Are pedagogical practices appropriate? Is teaching adequately assessed?

Teaching for probationary Group I faculty and for Group II faculty appears to be reviewed on a consistent basis, at least once per year and often once per semester. The mentoring process associated with probationary Group I faculty should emphasize teaching methods, and work to enable improvement in teaching. Probationary Group I and Group II faculty who attend pedagogy workshops (on campus or externally at academic conferences) should receive credit for doing so in their routine reappointment/tenure/promotion evaluations.

Tenured Group I faculty are not currently engaging in peer review of one another's teaching unless requested to do so (such as an associate professor who is pursuing promotion). The department should consider implementing a peer review of teaching for all tenured Group I faculty that is on par with the review of probationary Group I and Group II faculty.

The department should also consider incorporating their ongoing data gathering and tracking of downstream impact of student performance in preliminary courses into their official assessment of the sufficiency of the foundational courses.

Undergraduate students are not required to complete a capstone course. A capstone course would provide new opportunities for assessment of student learning. Based on discussions with faculty, it appears that less than one-half of students are completing a senior seminar. One option the department may want to consider is to modify the senior seminar course into a required capstone, or alternatively, create a new capstone course for all students.

f. Are students able to move into to discipline-related careers and/or pursue further academic work?

Yes.

Graduate Program

a. Is the program attracting students likely to succeed in the program? Is the number of students appropriate for the program? Is the program attracting a diverse group of students?

The department is recruiting students who are likely to succeed. Diversity is a challenge in graduate education in Mathematics when one considers gender, but a large number of international students does offer a diverse student body.

b. Does the graduate curriculum provide an adequate background to pursue discipline-related careers following graduation?

Evidence indicates that graduate students are successful in finding employment in both academic and non-academic settings.

c. Does the program provide adequate mentoring and advising to students to prepare them for discipline-related careers?

There is no formal mentoring process in the department but both faculty and students say that this is done informally on an as-needed basis. Graduate student interviews indicated general satisfaction with their preparation, in spite of financial difficulties attributable to graduate student fees and healthcare costs. Evidence indicates that doctoral graduates have the ability to become successful researchers (Appendix IV.2).

Faculty reviews graduate student teaching during their first year of teaching; however, these practices may not persist. The department should implement continuing faculty review and mentoring for graduate student teaching, and also encourage graduate students to peer review one another's teaching to promote the sharing of insight and best practices.

d. Are the resources and the number of and distribution of faculty sufficient to support the graduate program?

The department lost four Group I faculty lines in the past few years, and this loss is of concern. The range of expertise among Group I faculty has experienced a corresponding decline, and this may impact the effectiveness of graduate education—for example, the number of faculty who specialize in statistics may not be enough to meet graduate-student demands for that expertise. Further cuts in Group I lines are not advisable.

e. Does the program offer appropriate financial support to graduate students?

The underlying problems associated with graduate student support is a major concern. The level of support after the graduate student fee and healthcare costs leaves graduate students in a financially precarious position. Students also do not have significant opportunities for summer teaching. While the graduate student fee and healthcare issue is beyond the control of the department, the summer support issue is not. The department should consider reorganizing its summer-teaching policy to enable students to receive funding during the summer -- such a proposal appears to be in the works, but that change should be enacted quickly, ideally in time for Summer '19. Students need to be working on mathematics during the summer, and that can be accommodated by increasing opportunities for engagement with summer course offerings and summer teaching.

f. Is teaching adequately assessed?

Review of graduate teaching is primarily based on student evaluations. As discussed earlier, tenured faculty are not subject to peer review unless they ask for it. Graduate level teaching would likely benefit from including both review by faculty, and graduate student peer review.

g. Are students able to move into to discipline-related careers?

The department reports a relatively high placement rate for its doctoral students -- of the 26 doctoral students who graduated from 2006 through 2017, 23 were employed in mathematics departments at other universities (13 as tenure-track, one in a permanent teaching position, and the rest in full-time visiting positions). One of those 26 is employed in the software industry. The department was unable to find information about the other two.

The department reports that 50 master's students graduated from 2015-2017, about half of them have enrolled in Ph.D. programs (including several at Ohio University); seven have taken high-school teaching or industry jobs; and no information was available for 17 others. The department noted that getting placement information about international students is a challenge that is "targeted for improvement." The available information suggests success; however, the missing data makes full assessment problematic. The department should improve tracking of the activities of all students, especially its master's students.

Areas of Concern

The decline in graduation rates is an area of concern. The department should do a root cause analysis to determine the source of this trend. Otherwise, the committee's concerns relate to issues that are largely beyond the department's control. One of those concerns is the precarious financial circumstances faced by graduate students due to university-wide fees and healthcare costs, as well as college-level distribution of support. The committee makes some recommendations below about how the department might improve the situation for its own graduate students to some extent, but ultimately those issues must be improved at the college and university wide levels.

Recommendations.

The review committee identified a small number of areas that could benefit from improvement. As mentioned above, some of those areas, such as deferred maintenance of the building and financial difficulties of graduate students due to fees and healthcare costs are beyond the control of the department. For areas that are within the department's control, the committee offers the following recommendations.

The department should determine the root cause of declining enrollment of Mathematics majors and ways to bolster self-reported declines in international UG majors by more high-school or first-year-college recruitment efforts, as well as recruitment of non-traditional adult students into the applied programs with projected demand from industry (such as Actuarial Science and Mathematical Statistics).

With regard to graduate student support, a working proposal to set aside as many as half of summer teaching opportunities for graduate students would be highly recommended, at least until the university-wide issue of graduate student support is addressed.

According to statements made by faculty, the Mathematics Department does not maintain close contact with alumni. Creation of a listserv for alumni would be one strategy to encourage contact with alumni. Another strategy is the use of LinkedIn. The department could have students create LinkedIn profiles as an assignment in a required mathematics course that all undergraduate majors or graduates students take. Then, by connecting to these students on LinkedIn, the department would be able to keep track of alumni activity, and to more easily leverage alumni resources. To further encourage connections between students and alumni and the department, the department could consider creating a “company page,” which enables a better-managed LinkedIn experience. See, for example, the College of Business “company page”: <https://www.linkedin.com/groups/1886203/profile> (LinkedIn login required.) LinkedIn could also serve as a mechanism to lend support for students in the transition from the university to the job market. LinkedIn provides substantial job market functions, as well as providing connections to industry professionals. Students could benefit from a more robust usage of that resource.

Additionally, the Department may want to seek out on-campus assistance to bolster alumni relations. That could be done informally by consulting with other departments on campus that have stronger alumni ties (Alumni Services could identify such departments), social-media consulting from University Communications and Marketing, (<https://www.ohio.edu/ucm/communication/social-media.cfm>), or seeking assistance from student-run services such as 1804 Communications (award-winning student PR/advertising firm in the Scripps College of Communications).

Commendations.

The department is on a sound foundation, being able to meet its programmatic needs at all levels including service, undergraduate, masters and PhD. However, further reductions in Group I faculty could undermine this foundation. The Committee finds that the faculty are appropriately trained and are active in teaching, research and service. They care about student success and are working hard to increase success, retention and graduation. The department has a large number of programs relative to the department's size. However, the programs are designed to have appropriate overlap. Hence, the department is able to teach all courses for all programs within their budgetary and faculty number constraints.

Recent progress has been made in a key area of diversity in that the department has increased its number of women. Much, but not all, of this growth has been among Group II faculty. Other dimensions of diversity are even more difficult to address, but the department is making efforts. Faculty salaries are commensurate with other peer departments. Workloads are appropriate for the various faculty titles and ranks.

The undergraduate programs are effectively managed by experienced faculty members. Assessment procedures are compliant with university standards. Information, largely from "downstream" outcomes, is employed that informs the department of curricular and programmatic needs. Examples of effective assessment efforts are provided in the self-study.

Evidence is provided that the curriculum is in line with national professional organization standards. Advisors are active, engaged, and are able to assist students. The department has three student clubs that afford the possibility of student-faculty engagement. Undergraduate students regularly participate in the prestigious Putnam exams with some success. Other contests such as COMAP have been entered.

Management of online courses and courses at regional campuses has recently improved. Teaching assistants receive training upon arrival. Pre-tenure faculty have peer observations roughly every term. Group II faculty have made significant recent contributions to pedagogy, along some from Group I and some from regional campuses. Growth in interactive learning is occurring.

Relative to service courses, the department is actively engaged in the Ohio Math Initiative. Departments from around the state are working together to improve mathematics and statistics success, hopefully improving overall retention and graduation across the campuses. Gateway courses are established, with the new quantitative reasoning course to be piloted next fall. Co-requisite opportunities are planned. Limiting the students enrolling in College Algebra should by itself increase student success. Placement procedures are carefully thought through and are undergoing substantial alteration. The new placement tool, ALEKS, is an online adaptive learning program where placement is actually dynamic, with opportunity for review and some learning provided along the way.

Student quality is good at both undergraduate and graduate levels. Faculty are very helpful to graduate students, meeting needs on many levels, including curricular, research, advising, and even personal needs. Graduate student workload expectations are reasonable. The department staff is also quite helpful when the opportunity arises. The department also has a dedicated graduate director.

The department administration and staff have an excellent working relationship. Mutual respect is obvious. There seems to be sufficient staff to get the many jobs required by such a large department done.

Overall judgment: Is the program viable as a whole?

The judgement of the committee is that the Mathematics program is viable, but further budgetary cuts will likely undermine the effectiveness of the program, especially of those cuts result in the further erosion of Group I faculty.



TO: Internal Review Team, Department of Mathematics Program Review Committee, Ohio University

FROM: Donald B. White, Professor and Chair, Department of Mathematics and Statistics, University of Toledo

SUBJECT: External Reviewer Report

DATE: April 30, 2018

Serving as the external reviewer for the 2018 Program Review of the Department of Mathematics in the College of Arts and Sciences at Ohio University has been a pleasure. Based on my reading of the Self Study and visit to campus on April 19-20, my overall assessment is that this department knows what it is doing and is doing it well.

The Self Study is well-written, providing both perspective and detail. It provides a wealth of information about the department, its people and programs. It is refreshingly easy to read.

The joint report has a summary, commendations, and a small number of recommendations. We commend the department and its faculty in terms of research, teaching and service. Teaching success is particularly critical for a department with a large service mission such as this. Also, the staff is outstanding and has a great working relationship with the department administration.

Recommendations focus on enrollment challenges, graduation rates, alumni connections, and graduate student funding. The department is already addressing these areas.

The report we are submitting represents the collective understanding of all members of the review committee. I am in full agreement with the conclusions of the report.

It was good to join with the Ohio University Department of Mathematics in seeking to provide the best possible education to their students. I am glad to have had the opportunity.



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DATE: November 13, 2018

TO: John Cotton, Program Review Committee

FROM: Todd Eisworth, Chair of the Department of Mathematics ^{TE}

RE: Seven-year review of Mathematics Programs

The Department of Mathematics has reviewed the report submitted by the review committee as part of 2018 program review. We are pleased with their assessment that our programs are viable and show evidence of excellence, and that our program is achieving excellence in fulfilling its mission.

We find that all of their recommendations are reasonable and in line with our departmental goals. We address their main recommendations below:

- Address graduation rates and declining enrollment in undergraduate programs

Our undergraduate committee is now working on these issues. Much of the enrollment data is explained by a steep decline in the number of international (particularly Chinese) undergraduate students majoring in mathematics, as the number of domestic majors has remained fairly constant over the last decade. This reflects enrollment trends at the university. We will determine what drove the decrease in graduation rate, and how it is tied to the change in student demographics.

- Graduate Student Support

The main concern expressed is the lack of availability of funding for graduate students in the summer. We are working on revising our summer teaching policy, and the committee's recommendation (at least half of the summer teaching opportunities should be given to graduate students) will be considered. This issue is complicated by decreasing summer enrollments, and course-sharing with our regional campuses.

We can also look at keeping aside some of our graduate budget to provide some support to students in our Ph.D. program studying for comprehensive exams over the summer.

On another front, we are working to establish a graduate student support fund, and we have secured at least \$10,000 in donations to get such an account started.

- Alumni Engagement

We have already gotten a departmental LinkedIn account, and begun the work suggested in the report. Alumni engagement is coming along and we are looking for ways to get graduates involved. At our most recent advising event, we had one of graduates (now working for Nationwide) come down to meet with our current students, and the intent is to have more such opportunities for engagement.

Finally, we appreciate the various commendations from the committee on our teaching, research, and service. Our department has an incredibly broad mission, and we are committed to fulfilling this mission with excellence.

John,

I think that Todd's response indicates that the department is taking meaningful action to address the recommendations of the review. Beyond that I have nothing to add to his reply. If you need anything more formal from my office, please let me know.

Joe

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