UCF Academic Program Review 2016-17
Consultant Undergraduate Program Review

Program: Mathematics, B.S.

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Instructions: Please offer your assessment of each item below, considering when appropriate, your knowledge of other public research institutions. While a few items solicit an open-ended response, most ask you to rate a particular characteristic of the program under review as exemplary, appropriate, or needing improvement. At the end of each section, please elaborate on any items in that section identified as exemplary or needing improvement. Additional comments are optional. You may offer recommendations for improvement on the topics covered in each section at the end of the respective section and/or you may provide all recommendations for program improvement in item 8.3 at the end of this document.

Section 1 Program Goals and Planned Student Learning Outcomes (SLOs)

Please evaluate the following:

1.1 Program goals and objectives, including those related to planned student learning outcomes (In addition to the program self-study, you may wish to consult the Student Learning Outcomes Assessment library in the UCF APR Web site.)

Please select only one option from the list below:

- [ ] Exemplary
- [x] Appropriate
- [ ] Needs Improvement
- [ ] Don’t Know
- [ ] Not Applicable

Please elaborate if you identified item 1.1 as exemplary or needing improvement. Other comments are optional.

The mission of BS in Mathematics program is clearly stated and well aligned with the goals of UCF and the State of Florida

Recommendations, if any, in the area of program goals and planned student learning outcomes:

The student learning outcomes process that we reviewed (2015-16 from the APR web site) was thorough and complete. Our only suggestion is that the assessment instruments are always based on selected or embedded exam questions. We believe that some of the outcomes may be better evaluated using instruments other than exams; for example, student interviews at the end of a term and/or focus groups.

Section 2 Program Coordination and Administration
Please evaluate the following:

2.1 Program administrative and management structures to effectively run program (e.g., effectiveness of program coordination, process for monitoring students’ progress to degree, program handbooks, process for selecting preceptors/thesis advisors/research mentors/clinical supervisors)

Please select only one option from the list below:

[ ] Exemplary [X] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

2.2 Student access to resources to enhance student success (e.g., advising, faculty members, appropriate technology)

Please select only one option from the list below:

[ ] Exemplary [X] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

Please elaborate if you identified any items in this section (2.1-2.2) as exemplary or needing improvement. Other comments are optional.

Other comments are optional.

The advising of mathematics majors is done almost exclusively by a recently hired professional advisor, who does not have a mathematics background, and by the Associate Department Chair. We heard from the students that they do a great job helping them to navigate the various university processes.

Recommendations, if any, in the area of program coordination and administration:

We recommend that the mathematics full-time faculty be more involved in advising. Students should be advised by formal mentors when possible. The job of the professional advisor and the Associate Department Chair needs to be supplemented by advice from additional disciplinary and career experts.

Section 3 Program Demand and Productivity

Please evaluate the following:

3.1 Program’s ability to meet student demand for the major

Please select only one option from the list below:

[ ] Exemplary [X] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

3.2 Program’s curriculum contribution toward the General Education Program

Please select only one option from the list below:

[ ] Exemplary [X] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

3.3 Enrollment levels relative to faculty size and composition

Please select only one option from the list below:

[ ] Exemplary [X] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

3.4 Program’s ability and responsiveness to meet the needs of other disciplines (e.g., program offerings that support other programs)

Please select only one option from the list below:
3.5 Program’s ability and responsiveness to meet local, regional, and national needs

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

3.6 Student retention

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

3.7 Student time-to-degree in the program

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

Please elaborate if you identified any items in this section (3.1-3.7) as exemplary or needing improvement. Other comments are optional.

The Department does an excellent job providing GEP courses. It is the largest producer of credit hours at this level in the College. They maintain the MALL, where thousands of students receive instruction and help. They are starting to use Adaptive Learning methodologies.

Recommendations, if any, in the area of program demand and productivity:
The department has potential for a substantial increase in the number of majors, which we estimate could reach 500. The current major has too many concentrations, and it would benefit from simplification.

Section 4 Program Quality

Please evaluate the following:

4.1 Criteria for program admission (if applicable)

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

4.2 Quality and rigor of student learning outcome targets (Refer to Academic Learning Compacts and student learning outcomes assessment plans located in the Student Learning Outcomes Assessment library in the APR Web site.)

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

4.3 Evidence of student learning consistent with stated program goals (including planned student learning outcomes) and discipline standards

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable
4.4 Student licensure pass rates (if applicable)

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

4.5 Placement rates for graduates relative to disciplinary trends at other public research universities

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

Student Perceptions of Program Quality

Based upon your interactions with students in the program, please indicate how you believe students in the program view the program in the following areas:

4.6 Students’ perception of the overall administration of the program

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

4.7 Students’ perception of advising and mentoring

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

4.8 Students’ perception of program quality and rigor

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

4.9 Students’ perceptions of the academic and collegial atmosphere of the program

Please select only one option from the list below:
- Exemplary
- Appropriate
- Needs Improvement
- Don’t Know
- Not Applicable

Please elaborate if you identified any items in this section (4.1-4.8) as exemplary or needing improvement. Other comments are optional.

We met with a group of outstanding and very articulate students. They noted the different number of credit hours required by different concentrations, which in some cases force them not to take their first choice. They also reported widely different experiences in the same course when taught by different people. A student commented that textbooks assigned are sometimes not used. A student complained that while CS students can take advanced mathematics courses, the reciprocal is not easy to do. Overall, we found the students very satisfied with their math program at UCF.

Recommendations, if any, in the area of program quality:
The various concentrations available for the mathematics majors appears to be a source of confusion. We recommend to simplify the major, reducing it to perhaps two concentrations (applied and fundamental mathematics). The curricula and textbooks of key courses need to be coordinated across several semesters so that the students expectations of the course do not change much.
Section 5  
Student Characteristics and Quality

Please evaluate the following:

5.1  Program’s ability to attract high quality students

Please select only one option from the list below:

☐ Exemplary  ☒ Appropriate  ☐ Needs Improvement  ☐ Don’t Know  ☐ Not Applicable

5.2  Incoming students’ credentials

Please select only one option from the list below:

☑ Exemplary  ☐ Appropriate  ☐ Needs Improvement  ☐ Don’t Know  ☐ Not Applicable

5.3  Student diversity

Please select only one option from the list below:

☐ Exemplary  ☒ Appropriate  ☐ Needs Improvement  ☐ Don’t Know  ☐ Not Applicable

5.4  Quality of student accomplishments compared to similar programs at other public research universities (e.g., theses, creative works, papers presented; awards won; quality of subsequent graduate and professional programs entered; employment) (Refer to student works located in the Student Works library of the APR Web site as well as any additional student works you may have reviewed during your site visit.)

Please select only one option from the list below:

☐ Exemplary  ☒ Appropriate  ☐ Needs Improvement  ☐ Don’t Know  ☐ Not Applicable

5.5  Program relationship with alumni

Please select only one option from the list below:

☐ Exemplary  ☐ Appropriate  ☐ Needs Improvement  ☒ Don’t Know  ☐ Not Applicable

Please elaborate if you identified any items in this section (5.1-5.5) as exemplary or needing improvement. Other comments are optional.

The undergraduate honors theses that we reviewed were of excellent quality. The average SAT scores of mathematics majors are almost 150 points above the UCF average.

Recommendations, if any, in the area of student characteristics and quality:

We suggest organizing a Department of Mathematics graduation ceremony, independent from other ceremonies organized by the college or University, where each student will receive his or her diploma directly from the Department Chair. Students would bring their families. This is, we believe, the first step in building alumni relations. Inviting alumni to awards ceremonies can also be very helpful.

Section 6  
Curriculum, Course Offerings, and Student Engagement Opportunities

Please evaluate the following:
6.1 Current curriculum’s alignment with program goals

[ ] Exemplary [x] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

6.2 Design of core courses’ to provide students a solid foundation in the discipline

[ ] Exemplary [x] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

6.3 Availability and timeliness of required courses

[ ] Exemplary [x] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

6.4 Adequacy of student professional development opportunities (e.g., research, clinical experience, student teaching, service learning)

[ ] Exemplary [x] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

6.5 Overall quality and rigor of current curriculum

[ ] Exemplary [x] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

6.6 Incorporation of appropriate pedagogical and/or technological innovations into the curriculum

[ ] Exemplary [x] Appropriate [ ] Needs Improvement [ ] Don’t Know [ ] Not Applicable

Please elaborate if you identified any items in this section (6.1-6.6) as exemplary or needing improvement. Other comments are optional.

Recommendations, if any, in the area of curriculum, course offerings, and student engagement opportunities:
The five concentrations in the major (General, Mathematical Biology, Mathematical Economics, Computational Concentration, and Engineering/Physics Concentration) with their various course requirements makes the BS in Mathematics degree quite complicated. There is a lot of potential for scheduling and enrollment difficulties. To accommodate a larger number of majors, this structure needs to be simplified and streamlined. There should be very few, if any, small enrollment courses.

Section 7  Comparative Advantage

7.1 If applicable, please identify features that distinguish the program from similar programs at other institutions (e.g., curriculum, faculty member expertise, student engagement opportunities)
The BS program recruits very well qualified students with an average SAT score of 1,308.95 in 2015. These students are very good, and should do very well in their careers.

7.2 Does the program fit a disciplinary niche? If so, please elaborate.

No, but we do not expect an undergraduate program in mathematics in the US to fit a particular niche. What the program does is train students for a wide variety of careers, from graduate training in science and engineering to professional schools such as law, medicine and business. Mathematics majors tend to be really smart, and graduate programs and employers alike value that highly.

7.3 Please discuss the program’s potential for achieving discipline (re-)accreditation or (re-)certification, if available.

NA

Section 8  Analysis and Recommendations

8.1 Please identify up to five areas of greatest program strength.

1. Highly qualified students
2. Devoted advising staff (Associate Chair and Professional Advisor)
3. Faculty research reputation
4. Opportunities for undergraduate research and honors thesis

8.2 Please identify up to five areas of greatest concern for the program (e.g., program weaknesses, barriers, threats, unique vulnerabilities).

1. UCF Connect: The current system of fulfilling prerequisites with courses taken at community colleges needs to be revised. Too many transfers students are not making satisfactory progress. The DFW rate for transfer students is about 50% higher than for students who started as freshmen, as shown by reports from the Students Success Project made available to us.
2. Complicated curriculum.
3. Small number of math majors at UCF

8.3 Please reflect on program centrality, cost, comparative advantage, demand, and quality. Keeping these factors in mind, please offer your recommendations for program improvement considering each of the following, as appropriate:
- improvements necessary for successful continuation of program operation (if applicable)
- improvements that are not resource intensive, but that are likely to enhance program quality
- improvements that, if resources permit, could help take the program to the next level of prominence
Simplifying the curriculum and structuring the advising of undergraduate majors to give the full-time faculty a greater role will go a long way towards growing and improving the program. Given the quality of the students who choose to major in mathematics, the department should set very high expectations for their success.

Section 9 Executive Summary

In one to two pages, please provide your overall impression of the program, emphasizing key aspects of the review. As appropriate, contextualize your assessment in relation to best practices in the discipline of study, undergraduate education, the broader higher education landscape, and/or industry trends within the field.

The undergraduate mathematics program at UCF fulfills its service mission by teaching a large number of credits in GEP courses and in Calculus courses. These courses are taught largely by non-tenure track full-time faculty with the help of teaching assistants (TA). The typical class enrolls 300 students, divided in groups of 50 for each TA section. The TA sections are larger than is ideal, in our view. We were impressed by the use of the MALL, including adaptive learning in some courses, and by the dedication of the instructors and MALL staff. We heard plans about the new MALL 2.0, which will focus on community aspects (group work, interactions with peers) rather than each student working individually.

While we realize the difficulty in providing feedback to large numbers of students, we recommend that the Department of Mathematics add the use of graders, as it done in Physics and Psychology. Particularly in Calculus courses, feedback on the solutions of word problems and writing in general is very beneficial to the students understanding at a higher level than what multiple choice tests allow.

Given the volume of students in service courses, we also recommend adding one or two more instructors, as well as increasing the role of the tenured faculty in the teaching of Calculus. Having a tenured faculty member in charge of coordinating the undergraduate program is a common practice in the best departments. The instructors and lecturers we met with impressed us with their dedication and effort, but they appear to be underappreciated.

We noticed a substantial deficit in the preparation of transfer students as indicated by their DFW rates compare to the DFW rates of students who started as freshmen at UCF. While we recognize the strategic importance of UCF DirectConnect, we recommend that the coordination with faculty from the feeder institutions, which we understand is currently going on, be informed by these data so that students who transfer to UCF are placed in courses where they succeed. Mathematics is by nature a very hierarchical subject, where prerequisites play a key role.

Turning now to the BS program, we believe that the department has the potential to increase the number of math majors to about 500 and award 75-100 BS degrees per year. This will require a better organized and streamlined offering of upper-level courses. In particular, we recommend reducing the number of concentrations from five to possibly just two. Everyone benefits when you have more students taking more mathematics at a higher level. We also recommend increasing the role of the faculty in advising, to supplement the excellent job done by the professional advisor and the Associate Chair.

There needs to be some structured activity in recruiting of majors, and all faculty need to play a part. While the job of mathematician always ranks highly in the various job rankings, most departments in the US don’t do a good job of communicating the advantages of having a degree in mathematics to undergraduate students, many of whom may
not intend to attend graduate school. We recommend the establishment and/or strengthening of communication channels with the Admission Office and the Office of Career Services.

We suggest organizing a Department of Mathematics graduation ceremony, independent from other ceremonies organized by the college or University, where each student will receive his or her diploma directly from the Department Chair. Students would bring their families. This is, we believe, the first step in building alumni relations.

Finally, we suggest optimizing the using of open spaces in the Math Building. The wide aisles in the building could be ideal for large tables where the students could congregate and work in groups. The building is "classical," but still can be used to better effect for student success and enjoyment.