

Comprehensive Program Review for Mathematics & Statistics at UWGB

January, 2021

General and Overview

1. Describe your program's most significant opportunities and significant challenges.
 - a. Various majors and minors (major with two emphases, minor with three emphases, actuarial science minor)
 - b. Faculty specialties cover the key areas in Mathematics – Analysis, Algebra, Geometry, Applied Mathematics, and Topology.
 - c. The current curriculum has been well developed, covering all key areas and allowing for successful completion of major requirements in three years. Undergraduate research opportunities through independent studies and Math/Stat Club.
 - d. Successful education in lower level mathematics courses for STEM and Humanity students.
 - e. Successful education in mid-high mathematics courses for STEM students, in particular for engineering and mathematics students.
 - f. CCIHS participants – around 20 courses offered by 12 math teachers at 9 high schools in various areas in Wisconsin.
 - g. Around 60 sections a year at three branch campuses covered by 3 tenured faculty members and 2 lecturers – often depending on faculty overloads, ad-hoc instructors, and online sections.
 - h. Faculty recruitment for Statistics – it took several years to secure two faculty members in Statistics due to relocations and failed recruitment. The program suffered because it was not possible to offer regular courses.
2. What are some things that would help make your program and its students more successful?
 - a. Proper faculty substitution – no tenure-track/tenured faculty member at the Marinette campus (only one lecturer after one relocated in 2019) to adequately cover 15 sections a year. Only one faculty member at the Manitowoc campus (after one relocated in 2019) to cover 15 sections a year. Even though students at the branch campuses need more attention and guidance through face-to-face instructions, online instruction is the only option to offer at this time. Computer lab for Statistics courses – there are more than 15 sections of Statistics courses that require a lab, and the number is growing. It becomes increasingly difficult to find space at the general computer lab; 40+ computers would sufficiently satisfy student needs.
3. What are some program accomplishments worth highlighting? (Narrative)
 - a. Highly active research activities by faculty members.
 - b. Student-oriented instruction and curriculum.
 - c. Smooth transition and participation from the math programs at UW Colleges to Mathematics and Statistics program at UW-Green Bay.
 - d. Newly offered Actuarial Science minor and Mathematics minor with Applied Mathematics emphasis.

- e. Reviewed and established four pathways for UWGB Mathematics Competency requirement.
4. Have there been any significant changes that have affected your program? (Narrative)
 - a. Elimination of interdisciplinary major/minor requirements – the addition of an interdisciplinary major or minor like Environmental Science or Business was required for students; this is no longer the case.. However, students are able to complete a math major with an additional major/minor in a different area in four years because the math curriculum has been well-developed.
 - b. Project Coaster – seven faculty members were added to the program in 2017. There were significant differences in lower level courses in Mathematics. Even though they were successfully aligned, we still observe different demands among campuses.
 - c. Faculty changes – four new faculty members have filled the replacements for the last four years at the main campus.
 - d. Support for Engineering programs – newly established Electrical Engineering and Mechanical Engineering programs require several math courses for their majors.
 - e. More online offerings – the program had tried to offer online courses started from lower level courses. COVID-19 pandemic made it faster. We see possibilities in upper level courses.
 5. Where do you want your program to be 5 to 7 years from now? (Narrative)
 - a. 100+ students in majors and minors (currently 80+).
 - b. Launching a Mathematics major with Actuarial Science emphasis.
 - c. Developing Writing Emphasis courses. There is only one upper-level WE course (MATH 314) currently.
 - d. Good balance in online and offline offerings.
 - e. Most freshmen will be able to take college credit-bearing math courses when they start their career at UW-Green Bay. It requires a successful summer bridge program.

Demand

All data in this area is provided with the materials. (Graduates, majors, minors, etc.) This space is for any commentary you would like to apply to that material. (Narrative)

We expect a steady growth in numbers of majors and minors. To support the continuation of this trend, faculty retention and proper replacement will be a key factor. However, there is another perspective.

Since the completion of the Project Coaster, the importance of successful education in lower level math courses has risen. However, there is only one faculty member at each of the Marinette and Manitowoc campus. It will be essential for the branch campuses to secure at least two faculty members in order to offer effective and successful education in Mathematics.

Internal

1. Program goals (Mission, vision, learning outcomes; present as narrative/lists)

The Mathematics & Statistics curriculum is designed to meet the following six learning outcomes for our major, as well as minor. The program has accessed similar outcomes with different Mathematics and Statistics courses.

1. Mathematics majors will be able to understand important mathematical/statistical concepts, theorems, formulas, computational techniques and axiomatic systems in the required courses.
2. Mathematics majors will be able to demonstrate the ability to follow, construct, and write mathematical proofs.
3. Mathematics majors will be able to apply knowledge derived from the major content areas of Calculus, Analysis, and Linear Algebra.
4. Mathematics majors will be able to pose mathematical/statistical problems and select and apply appropriate mathematical/statistical theories, models and tools to solve and/or analyze the problems.
5. Mathematics majors will be able to demonstrate their understanding of how mathematics/statistics is used in the solution of real-world problems.
6. Mathematics majors will be able to use technological aids appropriately in the study of mathematics/statistics and properly interpret and assess the computed results.

2. Curriculum development (Lists, brief narrative if appropriate)

The Mathematics and Statistics curriculum supports two emphases in major – mathematics and statistics, and three emphases in minor – mathematics, statistics, and applied mathematics. It also supports a minor in Actuarial Science. The following two are newly developed:

- a. Actuarial Science Minor (2018) – covers enough material for the first two Actuary exams. An excellent option for students pursuing a major in Mathematics, Statistics, Economics, Accounting, or Finance.
- b. Mathematics Minor with Applied Mathematics Emphasis (2020) – an excellent option for engineering students

3. Connections to other programs (Lists, brief narrative if appropriate)

The program provides essential education in mathematics for the UWGB Mathematics Competency requirement.

- a. MATH 100 Math Appreciation – meets UWGB Mathematics Competency requirement mostly for Humanities/Arts/Language programs.
- b. MATH 094/099/101/104 Elementary/Intermediate/Advanced Algebra/Precalculus – STEM, Nursing, and Economics.

It also provides vital courses for various programs that require advanced skills in mathematics.

- c. MATH 202/203/209 Calculus I, II, III – Computer Science and Engineering programs.
- d. MATH 305 Differential Equations and MATH 320 Linear Algebra – Mechanical and/or Electrical engineering.
- e. ENV SCI 338 Environmental Modeling and ENV SCI 336 Environmental Statistics – Environmental Science.
- f. ENV E&P 755 Environmental Data Analysis – ES&P graduate program.

The program also supports a collaborative program, Actuarial Science minor, as mentioned in #2. Also, Mathematics faculty members have made strong contributions to the Environmental Science and Policy graduate program.

4. Number of courses offered (Overall number provided in materials. Chairs: short commentary if appropriate. Provide a sub-grouping of various modalities by percentage. For example, what percentage of your program is available online, hybrid, etc.?)
 - i) In 2019-2020, the program offered 22 courses (3 independent studies excluded).
 - ii) Among 22 courses, there were 3 developmental courses and 4 100-level courses, 4 200-level courses, and 11 300-level courses.
 - iii) Prior to the pandemic, we offered around 25% of developmental and 100-level courses online. None for upper level courses.
 - iv) We expect a similar percentage with 200-level courses after the pandemic. The numbers are projected to be higher for lower level courses.

5. Diversity of students, faculty, and curriculum (Overall number provided in materials. Chairs: short commentary if appropriate; provide examples from curriculum if appropriate.)
 - a. It has been confirmed by faculty members of Mathematics and Statistics that our ongoing commitment to diversity and inclusion of students, faculty, and our curriculum is solid.
 - b. There was a substantial increase in the number of transfer students in 2016 whereas the average age for majors has been younger in age in previous years (37.5 in 2013 and 23.11 in 2020)

6. Gen Ed, FYS/GPS, CCIHS (Lists)
 - a. Gen Ed – Quantitative Literacy (MATH 100, 202, 203, 260)
 - b. FYS – MATH 198
 - c. CCIHS – 9 high schools (NEW Lutheran, Mukwonago, Marinette, Manitowoc-Lincoln, Kohler, Kiel, Green Bay Southwest, Germantown, Albany) with 12 high school math teachers on MATH 104, 202, 203, and 260. It is expected to add more high schools each year.

7. Program support and staffing (Chairs: History, trends, and future needs. Depending on program, could be connected to accreditation.)

Refer to explanation above. Here is a summary:

- a. Faculty changes – four new faculty members have filled the replacements for the last four years at the main campus.
- b. It took several years to secure two faculty members in Statistics due to relocations and failed recruitment. The program suffered because it did not have adequate staffing to offer regular courses.
- c. Since the completion of the Project Coaster, the importance of successful education in lower level math courses has risen. However, there is only one faculty member at each of the Marinette and Manitowoc campus. It will be essential for the branch campuses to secure two faculty members to offer effective and successful education in Mathematics.
- d. Proper faculty substitutions – no tenure-track/tenured faculty member at the Marinette campus (only one lecturer after one relocated in 2019) to cover 15 sections a year. Only one faculty member at the Manitowoc campus (after one relocated in 2019) to cover 15 sections a year. Even though students at the branch campuses need more attention and guidance through face-to-face instructions, online instruction is the only option to offer at this time

8. Cost per credit hour (TBD)

External

1. Outreach: student/faculty partnerships, collaborations, participation with organizations or individually (Lists)
 - a. UWGB Math/Stat Club
 - b. American Mathematical Society
 - c. Mathematical Association of America
2. Contributions to regional infrastructure (Lists)
 - a. Turbocharge project with Green Bay School District and NWTC
 - b. 20 sections of CCIHS offered by 12 math teachers at 9 high schools in various areas in Wisconsin.
3. Scholarly activity of faculty (Lists that are not all-inclusive; maybe seek to highlight the different areas/types of activity)
 - Applied Mathematics (Gregory Davis, Tetyana Malysheva)
 - Geometry and Topology (Mark Norfleet)
 - Abstract Algebra (Woo Jeon)
 - Statistics (Megan Olson Hunt, Dhanamalee Bandara)

Student Success

1. High-impact practices and individualized-learning opportunities (Some data provided; lists and/or brief narrative)

- Individual instructions (independent study, honors project) have been provided as recommended by a faculty member or upon request by a student in various areas of Mathematics.
2. Retention (TBD. Note: if program-level data is not provided, maybe list some things your program does that you believe aid in retention.)

Mission Relevant

1. Relevance to mission (Narrative or lists as appropriate)
 - UWGB Mathematics and Statistics program has program objectives that share and support the mission of the UWGB because it offers an undergraduate program ‘with a commitment to excellence in teaching, scholarship and research, and service to the community.’ It certainly ‘provides a problem focused educational experience that promotes critical thinking and student success.’
2. Cultural enrichment (Narrative or lists as appropriate)
 - UWGB Mathematics and Statistics program provides educational opportunity at all levels (traditional and non-traditional students), and is open to provide community-based partnerships including CCIHS program.
3. Access (Does the program have any agreements with other institutions? For example, a transfer agreement with a technical college.)

There is no direct program agreement, but math courses are included in every transfer agreement in STEM areas including engineering programs with NWTC; agreements have been and we reviewed and approved.