**Annual Departmental Report**

***Amended for 2020-2021 Academic Year to Accommodate and Reflect Adjustments due to Pandemic***

*There are amended instructions throughout this document to reflect the special circumstances of this academic year (AY20-21) that you will find red. As an institution and as departments we have learned that we can use our creativity to deliver learning even in the most difficult of circumstances.*

**Program Information**

Program/Department: *Mathematics*

Department Chair: *Mary Ann Barbato*

Department Assessment Committee Contact: *Amy Wehe*

*This document is to be kept in the department and an electronic file is due to the Director of Assessment by May 15, 2021.*

1. **Departmental Special Section for AY2021**

Department Lessons Learned and Accomplishments

In thinking through the academic year, report on how the department adapted to changes brought on by the pandemic. Reflect on actions that surprised you, on lessons learned that will help in the future, and major accomplishments.

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| Mathematics department faculty learned, shared and utilized several technology tools and best practices in incorporating remote instruction and assessment. We kept in close communication with each other via meetings and emails and enhanced our google doc sharing skills. We all took the time to learn new tools, some of which we will continue to use moving forward.  We continued our seminar series and were able to have speakers from across the country present. We held a virtual induction ceremony for our Mass Eta chapter of Pi Mu Epsilon national mathematics honorary society with the most student inductees since our charter in 2007. We held our annual Elizabeth Haskins Mathematics contest virtually which included a guest speaker, solutions sessions and award ceremony.  The learning curve with some of the technology was a challenge to both students and professors. Another challenge was trying to help students who really struggled to learn mathematics remotely. Keeping up with emails was also a challenge for many of us and our students. |

1. **Program Learning Outcomes (PLOs) (Educational Objectives)**
2. **List of PLOs and the timeline for assessment.**

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| **PLO #** | **PLO – Stated in assessable terms.** | **Timing of assessment (annual, semester, bi-annual, etc.)** | **When was the last assessment of the PLO completed?** |
| **1.** | Students should develop effective thinking and communication skills.   1. state problems carefully, articulate assumptions, understand the importance of precise definition, and reason logically to conclusions; 2. identify and model essential features of a complex situation, modify models as necessary for tractability, and draw useful conclusions; 3. deduce general principles from particular instances; 4. use and compare analytical, visual, and numerical perspectives in exploring mathematics; 5. assess the correctness of solutions, create and explore examples, carry out mathematical experiments, and devise and test conjectures; 6. recognize and make mathematically rigorous arguments 7. read mathematics with understanding; 8. communicate mathematical ideas clearly and coherently both verbally and in writing to audiences of varying mathematical sophistication; 9. approach mathematical problems with curiosity and creativity and persist in the face of difficulties; 10. work creatively and self-sufficiently with mathematics. | (a)(c)(f)(h) – every other year  (b)(d)(e)(g) -every other year  (i)(j) – every 3 years (with PLO 4) |  |
| **2.** | Students should learn to link applications and theory.   1. Mathematics students should encounter a range of contemporary applications that motivate and illustrate the ideas they are studying 2. learn to apply mathematical ideas to problems in those areas. 3. Students should come to see mathematical theory as useful and enlightening in both pure and applied contexts. | Every three years |  |
| **3.** | Students should learn to use technological tools.   1. Mathematical sciences major programs should teach students to use technology effectively, both as a tool for solving problems 2. Mathematical sciences major programs should teach students to use technology effectively, as an aid to exploring mathematical ideas. 3. Use of technology should occur with increasing sophistication throughout a major curriculum. | Every three years |  |
| **4.** | Students should develop mathematical independence and experience open-ended inquiry.   1. A mathematical sciences major should be structured to move students beyond the carefully choreographed mathematical experiences of the classroom. 2. A major curriculum should gradually prepare students to pursue open-ended questions 3. to speak and write about mathematics with increasing depth and sophistication. | Every three years |  |

1. **PLO Assessment** (Please report on the PLOs assessed and/or reviewed this year. Programs should be assessing at least one each year.) **.** ***None. We worked on Davis grant initiatives***

Using the table below, list and briefly describe the **direct method(s)** used to collect information assessing whether students are learning the core sets of knowledge (K), skills (S) and attitudes (A) identified as essential.

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| **PLO # (from above)** | **Assessment description (exam, observation, national standardized exam, oral presentation with rubric, etc.)** | **When assessment was administered in student program (internship, 4th year, 1st year, etc.)** | **To which students were assessments administered (all, only a sample, etc.)** | **What is the target set for the PLO? (criteria for success)** | **Reflection on the results: How was the “loop closed”?** |
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If applicable, use the space below to report on PLO assessment impacted by the move to remote learning.

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**Summary of Findings:** Briefly summarize the results of the PLO assessments reported in Section II above combined with other relevant evidence gathered and show how these are being reviewed/discussed. How are you “closing the loop”?

Please reflect on changes that the department has had to engage in given changes to teaching modality and especially capstone experiences.

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| **Reflection Prompt** | **Narrative Response** |
| **Other than GPA, what data/ evidence is used to determine that graduates have achieved the stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)** |  |
| **Who interprets the evidence?**  **What is the process?**  **(e.g. annually by the curriculum committee)** |  |
| **What changes have been made as a result of using the data/evidence? (close the loop)** |  |

1. **Assessment Plan for Program/Department**
2. Insert the program or department Assessment Plan ***(see section BI above)***
3. Explain any changes in the assessment plan including new or revised PLOs, new assessments that the program/department plans to implement and new targets or goals set for student success.

*We spent most of this year creating a short list of goals, along with an Action Plan for our students for the DEF grant. Details may be provided upon request.*

1. If you do not have a plan, would you like help in developing one?
2. **Program Review Action Plan or External Accreditation Action Letter/Report**

*Annual Reflection/Follow-up on Action Plan from last Program Review or external accreditation (only complete the table that is appropriate for your program)*

* 1. **Programs that fall under Program Review:**
     1. Date of most recent Review: May 24, 2017
     2. Insert the Action Plan table from your last Program Review and give any progress towards completing the tasks or achieving targets set forth in the plan.

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| **Specific area**  **where**  **improvement**  **is needed** | **Evidence to**  **support the**  **recommended**  **change** | **Person(s)**  **Responsible for**  **implementing**  **the change** | **Timeline for**  **implementation** | **Resources**  **needed** | **Assessment**  **Plan** | **Progress made this year** |
| STEM resource center (math and science) | Additional support needed for students in science courses, who often face mathematical difficulties in  their courses. | Dean of HNS John Schaumloffel will coordinate efforts in collaboration with representatives from STEM departments | Discussed in fall 2018. | Space, computer, staff. | TBD | NA |
| Math Center | The Math Center often  seems disjoint from the department. It is located in a different building and although there is some collaboration between the two, there should be more. | Department chair will maintain ties and perhaps appoint a Math Center Liaison from the department. Math Support Specialist will also collaborate with center | Fall 2018 and ongoing |  |  | Held meetings with center director and faculty members & math support specialist attended meetings with tutors |
| Careers | We are unsure what skills are most important in securing and succeeding in a math related position in industry and are understaffed in the areas of applied mathematics and statistics. We have limited information on local internship and job opportunities to help students find such opportunities. | The department is submitting corresponding tenure track requests. Mary Ann Barbato, as part of her sabbatical, collected and shared information on internship & job opportunities, corresponding companies and curricular pathways. | Spring 2017 and ongoing. | New FT faculty members in applied mathematics and statistics | Student surveys & alumni data | Hired a tenure track faculty member well versed in applied mathematics, statistics and computer science. Have plans to post some math career and internship info. on website |
| Dev. Math Coordinator | We have had a one year temp. serving in this role for the past 4 years. | The Mathematics Department is in the process of a corresponding search for an FT staff member to fulfill this role | Spring 2018 - | Staff position which has already been granted | Position will be reviewed after the first year. | Sustained FT Math Support Specialist and expanded her role with co-requisite instruction and coordination |
| Assessment Plans | Our current assessment plan is very dated and needs to be revised. | The department Assessment Committee is working on a new plan. | Fall 2017 - |  | Assessment data will be collected by dept. | Developed career competencies and action plan via Davis grant activities |
| Math Software | We have some new faculty who use different software and would also like to expand our software exposure to our students. | An ad hoc dept. committee will evaluate what software we would like to retain and which we would like to remove/  replace/add. | Fall 2017. Revisit in Fall 2018 |  | TBD | Adopted a site license for Mathlab software and incorporated it into classes |
| QR requirement | Quantitative reasoning is gaining attention nationwide as a more appropriate math experience for certain majors and our faculty see it as a desirable option for students at Fitchburg State who do not have a prescribed mathematics requirement. | Members of the Math dept. in collaboration with appropriate departments are developing a QR course titled Math in Society which has already been approved by AUC and is on the schedule for next AY. | Spring 2018 – | Additional faculty support | Collect & analyze performance and retention data after first year. | Expanded number of sections of Math in Society which will fit it well with new LA&S program |
| Co-requisite instruction | There is a statewide push toward real time remediation as it expedites students’ path through developmental mathematics. In our initial pilot it showed to improve retention rates. | The department is continuing to use co-requisite instruction in math 1700, has expanded to math 1250 and 1800 and in fall 2018 will expand to the new QR course and math 1500. | Fall 2017 - | Additional faculty support | Collect & analyze performance and retention data. | continued corequisite instruction in nearly all gateway math courses |
| BHE plans for developmental math | There is a statewide initiative piloting the use of HS GPA to place students into college level mathematics | The Math dept. has participated in the pilot and is expanding this alternate form of placement to several math courses. | expansion began in Fall 2017 and will continue into AY 18/19. |  | Collect & analyze performance and retention data | Implemented new policy incorporating hs gpa into prerequisites of nearly all gateway math courses |
| Graduate programs in STEM Ed. | The numbers in our graduate programs for teachers are low by department and streamlining into a joint program may solve this problem and enable us to better serve teachers in these fields. | Dean of Education, Bruno Hicks in collaboration with representatives from STEM departments | Explore options and check demand in Fall 2018 |  | TBD | NA |
| Statistics | Although some faculty in the department have taken statistics classes, we do not  currently have a statistician on the faculty in this department. Since statistics is an area of math that is highly useful in industry and otherwise, we will be looking for ways to strengthen our department in that area. | Mathematics department | Fall 2017 - | Tenure track faculty member (statistics focus) |  | Hired a tenure track faculty member well versed in statistics |
| Collaboration w. other depts. | One way to improve our students’ educational experience in STEM is to make more connections between our mathematics service courses and other courses. | The Mathematics department has been in collaboration with several departments including: Bio/Chem, EGS, Comm. Media, Education, | Fall 2017 - |  |  | Collaborated with other departments on new LA&S designations |
| Collaboration w. MWCC | Mass Transfer and Math Pathways statewide efforts for ease of transfer | Since Fall 2015, several members of the Math dept. have represented Fitchburg State on statewide committees related to these efforts and worked with MWCC among other statewide institutions to align courses and curriculum. These efforts will continue. | Fall 2017 - |  |  | worked with STEM faculty to establish a pathway for licensure track students |

* 1. **Programs with external Accreditation:** NA
     1. Professional, specialized, State, or programmatic accreditations currently held by the program/department.

*DESE accreditation renewed for licensure programs*

* + 1. Date of most recent accreditation action by each listed agency.

*DESE accreditation: March 2021*

* + 1. Date and nature of next review and type of review.CES about Anti-Racism and Anti-Biases

*Next DESE review expected in 3-7 years.*

1. **Departmental Strategic Initiatives**

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| **Accomplished Initiatives AY 20-21 Add more rows as needed** | **Corresponding Strategic Plan Goal & Strategy**  **Goal # followed by Strategy # ex: 1.3** | **Indicate if a Diversity, Equity and Inclusiveness (DEI) Goal** |
| Established designations for our courses in the new LA&S (general education) curriculum | 1.1: Fortify and promote the distinct role of the general education curriculum that provides every undergraduate student a relevant and challenging liberal arts foundation. |  |
| Developed career competencies and action plan for math major (Davis grant) | 2.1: Achieve a cultural shift around how we advise, mentor, and teach all students, especially traditionally underrepresented and underserved students, so that we meet them where they are |  |
| Held meeting with tutor center, faculty members and math support specialist where we shared concepts students struggle with, best ways to help each other and the students, and developed was to continue communication between tutors and instructors moving forward | 2.4: Ensure all processes and support services are adequate to meet the unique needs of transfer students, non-traditional students, online learners, and graduate students. |  |
| Worked on OER initiatives including developing our own text for math 1500 | 2.1 Achieve a cultural shift around how we advise, mentor, and teach all students, especially traditionally underrepresented and underserved students, so that we meet them where they are. |  |
| Sent representative to PD Institute on Racial Equity in Pedagogy and Practice | 2.3: Provide faculty and staff training around equity and inclusiveness both in and out of the classroom. | Y |
| sent representative to CES (Collaborative for Educational Services) workshops about Anti-Racism and Anti-Biases | 2.3: Provide faculty and staff training around equity and inclusiveness both in and out of the classroom. | Y |

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| **Initiatives/Goals for AY 21/22** | **Corresponding** [**Strategic Plan**](https://www.fitchburgstate.edu/sites/default/files/documents/2020-12/Final%20Strategic%20Plan%20Dec%202020.pdf) **Goal and Strategy** | **DEI Goal?**  **Y or N** |
| Finalize action plan for math major via Davis grant | 2.1: Achieve a cultural shift around how we advise, mentor, and teach all students, especially traditionally underrepresented and underserved students, so that we meet them where they are |  |
| Formalize math career advising | 2.5: Integrate career services into departments and curriculum, and build more consistent career advising across campus, especially for first-year students and sophomores. |  |
| Discuss how to incorporate internships into the math major | 1.2: Establish a learning environment in which academic and co-curricular programs work in synergy to offer applied learning experiences that prepare students for purposeful personal and professional lives. |  |
| Collaboration with other departments on research and curriculum (e.g. CS on Data Science minor) | 1.3: Promote greater interdisciplinary teaching and develop innovative combinations across academic departments. |  |
| Increase enrollment in math major and minor via active recruitment | 2.6: Adopt an integrated approach to enrollment management to achieve more systemic and centralized coordination of student recruitment and retention efforts. |  |
| Open lab hours for introductory level math classes (could help pave the way for STEM resource center) | 2.4: Ensure all processes and support services are adequate to meet the unique needs of transfer students, non-traditional students, online learners, and graduate students. |  |
| Expand collaborate with Math Center | 2.4: Ensure all processes and support services are adequate to meet the unique needs of transfer students, non-traditional students, online learners, and graduate students. |  |
| Collaborate with MWCC on curriculum and transfers | 2.4: Ensure all processes and support services are adequate to meet the unique needs of transfer students, non-traditional students, online learners, and graduate students.  5.7: Remain affordable and accessible to all prospective and incoming students. |  |
| Expansion of OER use | 2.1 Achieve a cultural shift around how we advise, mentor, and teach all students, especially traditionally underrepresented and underserved students, so that we meet them where they are. |  |
| Gather ideas from PD Institute on Racial Equity in Pedagogy and Practice | 2.3: Provide faculty and staff training around equity and inclusiveness both in and out of the classroom. | Y |
| Have department representative participate in Faculty Academy | 2.3: Provide faculty and staff training around equity and inclusiveness both in and out of the classroom. | Y |

**F. Departmental Reflection:**

*Take this section to reflect on--*

1. Initiatives that you may be considering for 22-23 academic year that you did not already capture above.

*Internships, increase math enrollment, STEM success center, 4+1 programs for licensure track students?*

1. Reflect on how the department adapted to the pandemic. Reflect on actions that surprised you and on lessons learned that will help in the future.

*Already answered at the beginning.*