



# Faculty Course Modification Incentive Grant – Maine Learning Assistant Program

*Portfolio of 2019-2020 FIG-MLA courses*



## Overview of 2019-2020 FIG-MLA courses

- 33 courses: 21 fall and 17 spring (some courses are offered both fall and spring)
- 31 instructors: 23 fall and 20 spring (some teach both fall and spring)
  - 18 have engaged with the Center for Innovation in Teaching and Learning (CITL)
- 15 departments: 12 fall and 10 spring
- 150 MLA positions: 88 fall and 62 spring
- 5573 students impacted\*: 3,225 fall and 2,348 spring

\* represents the sum of estimated student enrollments for each course (based on Fall 2018 and Spring 2019 course enrollments), not unique

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## 2019-2020 FIG-MLA Courses

Appendix A on pages 17-18 includes a short list of all courses below.

- 1) *AST 109 Introduction to Astronomy* – David Batuski  
Semester and Year in Program: Spring, Year 4  
Estimated Student Enrollment: 127  
Number of MLAs: 3  
CITL engagement: Instructional Designer support

Course Enhancements: *AST 109* is a flipped lecture class - with essential support of three MLAs in each of the past three offerings of the course by Dr. Batuski (Fall 2016, Fall 2017, and Spring 2019). Students are required, as 'homework', to watch recorded lectures for the course - including answering embedded 'clicker questions' that are graded. Students are then expected to come to class meetings with notes from each lecture. During class periods, students often take a group-interactive short quiz on the current lesson, work in groups of three or four on interactive astronomy tutorial exercises (most from the University of Arizona NSF-funded Center for Astronomy Education), watch videos on current course topics (with questions), or take textbook-based Blackboard quizzes.

Evidence of Impact: In a quick comparison of the 'pre-flip' Fall 2015 Prelim 1 exam, with the exact same exam given in Fall 2016, Fall 2017, and Spring 2019, overall class averages are essentially unchanged - within 1 - 4 % of the 2015 average. Some particular questions on the exam that were targeted by the MLA-intensive tutorials had substantial improvements, such as ones on the motions of the sun, moon and planets against the background of stars, lunar and solar eclipses, the visible portion of the moon, and the 'personal' nature of the horizon.

- 2) *BIO 100 Basic Biology* – Farahad Dastoor and Julia McGuire  
Semester and Year in Program: Fall, Year 8 and 4 (two proposals)  
Estimated Student Enrollment: 752  
Number of MLAs: 18  
CITL engagement: Community of Practice (McGuire)

Course Enhancements: MLAs facilitate classroom discussion during clicker questions posed during lecture, assist with discussion during case studies presented (5 through the semester). Case studies are capstone activities after each unit of the course is completed. MLAs help "hear" what points of frustration are in the classroom and provide feedback to instructors, as well as help edit questions, activities, and exams for clarity.

Evidence of Impact: Qualitative difference in the classroom. Students are regularly more engaged. In past saw a drop in BIO100 DFW rates, but have not repeated the analysis recently. BIO100 and BIO200 are no longer viewed as *THE* UMaine weed-out classes by undergraduates but have not reduced rigor in any way.

Qualitatively, course evaluations are good and many comments indicate students enjoyed the case studies as well as the presence of MLAs during lecture.

3) *BIO 200 Biology of Organisms* – Farahad Dastoor and Julia McGuire

Semester and Year in Program: Spring, Year 3

Estimated Student Enrollment: 301

Number of MLAs: 6

CITL engagement: Community of Practice (McGuire)

Course Enhancements: MLAs facilitate classroom discussion during clicker questions posed during lecture, assist with discussion during case studies presented (5 through the semester). Case studies are capstone activities after each unit of the course is completed. Modeling this structure from BIO 100 and have built three activities for BIO 200 with plans for more. MLAs help "hear" what points of frustration are in the classroom, as well as help edit questions, activities, and exams for clarity.

Evidence of Impact: Qualitative difference in the classroom. Students are regularly more engaged. In past saw a drop in BIO100 DFW rates, but have not repeated the analysis recently. BIO100 and BIO200 are no longer viewed as *THE* UMaine weed-out classes by undergrads but have not reduced rigor in any way. Qualitative data indicate that MLAs increase the level of discussion between students in the class and provide multiple avenues to address student questions. In addition, 30 students participated in a pre-exam concept mapping activity (April 2019) that is being tested as a skill-building study session to run again next year. The students worked in groups to map out selected exam topics by key concepts covered, and link ideas within and across topics. The students built it collectively, then share it with other classmates. An MLA attended and helped facilitate. Students reported feeling more confident after the hour and a half mapping session. Will be repeating the activity.

4) *BIO 307 Introduction to Neuroscience* – Kristy Townsend

Semester and Year in Program: Fall, Year 4

Estimated Student Enrollment: 49

Number of MLAs: 2

CITL engagement: Pedagogy workshops, Summer Institute on Evidence-Based Teaching

Course Enhancements: Using numerous active learning techniques, and a couple of years ago tested the course modification to hold class once a week. Each weekly class meeting has a theme, with a combination of interactive lectures, thought questions, article discussions, data activities, case studies, and other active learning approaches. Recently tested removal of formal exams in exchange for grades comprised of more group and participation type work, and continue to monitor the effect of this intervention in 2019.

Evidence of Impact: Developed pre- and post-tests that have been used in course thus far and will also be used for BIO 307 each fall to assess student attitudes to active learning and MLAs as well as learning outcomes.

5) *BIO 350 Concepts and Applications of Genetics* – Ek Han Tan/Kristen Brown-Donavan (from Michelle Smith)

Semester and Year in Program: Fall and spring, year 8

Estimated Student Enrollment: 198 (84 fall and 114 spring)

Number of MLAs: 6 (3 fall and 3 spring)

CITL engagement: Instructional Designer support (Tan and Brown-Donavan)

Course Enhancements: The FIG-MLA course modifications for introductory genetics (BIO 350) has allowed BIO 350 to developed as a highly interactive, active learning environment that facilitates learning of core genetics concepts that are often challenging for students. The active learning components of the course allows students to interact and solve activities together. The MLAs play crucial roles in these activities, which would not be possible with just the instructor due to the large class size. MLAs in BIO350 help students discuss clicker questions, facilitate in-class group activities, and lead well-attended homework help sessions.

Evidence of Impact: Some topics remain a challenge to students, but in general, we see a large positive impact from course modifications (using the Genetics Concept Assessment as a pre/post-assessment tool) with student scores increasing from 30-40% (depending on year) correct in the pre-assessment to 55-65% correct in the post-assessment. GCA results continue to iteratively inform teaching for each semester.

- 6) *BIO 480 Cell Biology* – Kristy Townsend  
Semester and Year in Program: Spring, Year 5  
Estimated Student Enrollment: 32  
Number of MLAs: 2  
CITL engagement: Pedagogy workshops, Summer Institute on Evidence-Based Teaching

Course Enhancements: Using numerous active learning techniques, including science-based debate, writing and peer-reviewing a mini-review, working with data, professional development skills, and a book discussion (about *The Immortal Life of Henrietta Lacks*). Starting in 2019, the class was fully flipped and instructor will continue to test the outcomes from this recent course modification.

Evidence of Impact: Currently incorporating a pre-test and post-test that was developed with the help of a MST student. Pre- and post-assessment questions about important concepts in cell biology showed a significant increase in scores as well as student understanding and thinking. For example, students were asked to list 1) cell communication methods and 2) organelles. Data for both questions revealed increases in the number students listed. The impact of newly flipped class in 2019 will be investigated.

- 7) *BMB 155 Genome Discovery II: From DNA to Genes* – Sally Dixon Molloy  
Semester and Year in Program: Spring, Year 6  
Estimated Student Enrollment: 36  
Number of MLAs: 2

Course Enhancements: In order to provide more active learning experiences in the second semester of the Phage Genomics course, BMB155, the use of class time was changed so that two of the three weekly class periods were used for active group learning and one period was used for interactive lectures or journal club discussions. There were three major activities/projects on which the students worked during the semester: assembly of the bacteriophage genomes, annotation of the bacteriophage genome, and individual computations research projects. The students worked collaboratively on these projects. In groups during class, students had opportunities to share their work with each other and make further progress on their projects. Students received feedback not only from each other on their work but from an MLA or instructor.

Evidence of Impact: The Science Education Alliance Classroom Undergraduate Research Experience (SEA CURE) pre- and post-course survey is a tool that assesses student learning outcomes after participating in a SEA PHAGES course (BMB150/155 at the University of Maine) as part of the National Genomics Research Initiative (NGRI) funded by the Howard Hughes Medical Institute. There were positive learning gains in four of the topics covered in BMB155. In order to improve content learning gains in the course, we propose increasing formative and summative assessment throughout the course.

- 8) *BMB 207 Fundamentals of Chemistry* – Jennifer Newell-Caito  
Semester and Year in Program: Fall, Year 1  
Estimated Student Enrollment: 223  
Number of MLAs: 4  
CITL engagement: Community of Practice, Summer Institute on Evidence-Based Teaching

Course Enhancements: Will add a case-study per week and develop more in-class worksheets to engage students in the material. Four MLAs will assist students with this material during class, which will help in making more connections personally and academically with the students. Additionally, BMB 207 students have been asking for weekly review sessions to discuss the material and this would not be possible without this grant. In terms of instructor to student ratio this has made a huge impact from 1:250 to 7:250, since the department has now granted two TAs for BMB 207 as a result of receiving this grant.

Evidence of Impact: None yet - Fall 2019 will be the first time with MLAs.

Plan for Measuring Impact: The attitudinal assessment tool that will be used is modified from existing published material from the Journal of Chemical Education. These will gauge aspects of student anxiety, comfortability with the classroom experience, and perceptions of our chemical bonding module. The pre-post assessment for each course will be collaboratively constructed following literature searches to determine appropriate content questions applicable to each course and within the context of the BMB department's chemistry sequence. To elaborate further, each individual course's attitudinal and content assessment will provide both course-specific and sequence-specific questions. The course-specific questions will assess the student learning outcomes for the individual course. The sequence-specific questions will include questions aimed at identifying the knowledge base of incoming students, retention of concepts from course-to-course, and the outgoing competency of students completing our unit's chemistry sequence.

\*Instructors of BMB 207 and BMB 221 are working collaboratively to design an interactive teaching module about chemical bonding to use in BMB 207, 208, and 221. Data will be collected to measure impacts on students learning and if useful, the module will be expanded to include additional topics.

- 9) *BMB 221 Organic Chemistry* – Edward Bernard  
Semester and Year in Program: Fall, Year 1  
Estimated Student Enrollment: 73  
Number of MLAs: 2  
CITL engagement: Pedagogy workshops

Course Enhancements: Since live lectures have already been replaced with narrated PowerPoints that students view before coming to class, modifications will include the incorporation of more student-centric problem-solving, rather than the instructor-led problem solving that was present in fall of 2018. MLAs will aid in this student-driven approach by helping facilitate discussions and guiding students in the right direction.

Evidence of Impact: No data have been collected since the changes are expected to take place in fall 2019, but the success of this approach in BMB 300, and the decrease in DWFL's in BMB 221 from fall 2017 (~40%) to fall 2018 (~<20%) indicate these active learning approaches will be successful.

Plan for Measuring Impact: The attitudinal assessment tool that will be used is modified from existing published material from the Journal of Chemical Education. These will gauge aspects of student anxiety, comfortability with the classroom experience, and perceptions of our chemical bonding module. The pre-post assessment for each course will be collaboratively constructed following literature searches to determine appropriate content questions applicable to each course and within the context of the BMB department's chemistry sequence. To elaborate further, each individual course's attitudinal and content assessment will provide both course-specific and sequence-specific questions. The course-specific questions will assess the student outcomes for the individual course. The sequence-specific questions will include questions aimed at identifying the knowledge base of incoming students, retention of concepts from course-to-course, and the outgoing competency of students completing our unit's chemistry sequence.

\*Instructors of BMB 207 and BMB 221 are working collaboratively to design an interactive teaching module about chemical bonding to use in BMB 207, 208, and 221. Data will be collected to measure impacts on students learning and if useful, the module will be expanded to include additional topics.

- 10) *BMB 300 General Microbiology* – Edward Bernard  
Semester and Year in Program: Fall, Year 2  
Estimated Student Enrollment: 129  
Number of MLAs: 3  
CITL engagement: Pedagogy workshops

Course Enhancements: Live lectures have been replaced with narrated PowerPoints that students view before coming to class. In class, students work collaboratively or on their own on problems related to the concepts covered in the PowerPoints. MLAs circulate to facilitate participation in and completion of these assignments.

Evidence of Impact: The total number of students earning an A or A- doubled in fall of 2018 (with MLAs) compared with fall 2017. Furthermore, 41% of MBMS majors earned an A- or an A in the fall of 2018 compared with the fall of 2017 (~18%). More data analysis to be completed Summer 2019.

- 11) *BMB 322 Biochemistry* – Joshua Kelley  
Semester and Year in Program: Spring, Year 3  
Estimated Student Enrollment: 128  
Number of MLAs: 5

Course Enhancements: Tophat is used to ask questions during class, ranging from multiple choice to short answer, where a word cloud is used to examine how the class was thinking about the question. Approximately 10 minutes out of each 50 minute class period is spent on active learning exercises. Will be creating more opportunities for group problem solving during class, with MLA's available to help groups of students work through the logic of the problems. Plan to increase the amount of class time dedicated to active learning to 15-25 minutes and hope to utilize more complex problems, multi-step questions, and/or case-studies. This will provide the students with increased opportunities to practice their critical thinking and problem solving skills.

Evidence of Impact: Average exam scores went up with the addition of MLAs. Will modify the course more this year to get even more MLA time with the students in class. Looked at un-curved test scores between a class without MLA's and a class with MLA's. Exams were written to be as similar in content and difficulty to the previous years so they could be compared. Currently examining performance based on the Bloom's taxonomy of each question, as that might give some insight into the effect on higher order thinking skills.

- 12) *CET 326 Soil Mechanics and Foundations* – Meredith Kirkmann  
Semester and Year in Program: Fall, Year 1  
Estimated Student Enrollment: 28  
Number of MLAs: 2  
CITL engagement: Community of Practice, Summer Institute on Evidence-Based Teaching, Instructional Designer support

Course Enhancements: Will increase available class time for students to better learn how to thoughtfully solve engineering problems. From observation, student understanding is greatly increased by spending more time on problem-solving, group work, group quizzes, and in-class activities instead of their first interaction with concepts and content. Going forward, all class time will be used solving problems and in active work. While some examples may be completed by the instructor during class time if there are common problems amongst students, class time will not be used for presenting new soil mechanics content. Currently modifying all elements of the course with CITL to build video lectures and online examples to replace in-class lecture content. With the additional in-class time, students will be working individually and in groups to complete higher level, active learning activities such as analyzing soil mechanics problems and applying soil mechanics principals to engineering problems. Class times will be used for individual problem solving, group problem solving, group quizzes, and thoughtfully determining how to choose a pathway to a solution instead of jumping into equations, tables, and assumptions.

Evidence of Impact: None yet - Fall 2019 will be the first time with MLAs.

Plan for Measuring Impacts: Exam score data will be collected and compared to past exam scores. A comprehensive multiple choice exam using the same questions has been given for the past two years and will be compared to scores from the upcoming semester to gauge whether students are performing better at understanding the full course content of soil mechanics. Non-course content problems given at the beginning,

middle, and end of the semester, will also be given as well as reflections on how the problem-solving process went. A qualitative comparison will be used to determine whether the daily in-class problem-solving process is helping students to become better problem solvers for non-course content problems.

13) *CHY 121 General Chemistry I* – Sarah Lindahl

Semester and Year in Program: Fall, Year 2

Estimated Student Enrollment: 300

Number of MLAs: 6

CITL engagement: Summer Institute on Evidence-Based Teaching

Course Enhancements: Fall 2019 will be first semester using MLAs in CHY 121. Added CHY 121 based on success of using MLAs in CHY 122 during Spring 2019. For CHY 121, not only will tutorials be created that cover concepts discussed in class but also a series of tutorials, possibly paired with short videos, that can serve as math remediation for those students with weaker skills. Each chemistry tutorial will contain an informational section that tells students the fundamental skills they'll need to use to master this content and will direct them to additional tutorials that teach them those skills. This way, students can practice fundamental skills (i.e.: logarithms, scientific notation, unit conversion, etc.) if needed and then understand how those skills pair with course-specific content. Through tutorials students will make the connections between material by explicitly recalling information that has been covered previously and by combining topics that allow students to utilize a multitude of skills they have acquired over the semester. MLAs will spend a lot of time interacting with students in both lecture and recitation and inform instructor of topics that students are struggling to grasp, enabling the instructor to tailor tutorials to student needs.

Evidence of Impact: None yet - Fall 2019 will be the first time with MLAs.

Plan for Measuring Impact: Using a mandatory pre- and post-exam to assess student knowledge at the beginning and end of the course to see what learning gains have occurred. Will administer a mid-semester survey which strives to gauge student attitudes about various topics related to the course (i.e.: online homework, recitation periods, use of clickers in the classroom, effectiveness of recitation assistants, quality of course materials, availability and helpfulness of additional resources, etc.). Mid-semester surveys are used to determine what aspects of the course are serving the desired function and contributing to improved student performance and to see what modifications can be made to better serve students. Will compare assessment scores for students who have recitation in the active learning classroom relative to those that have recitation in the traditional lecture-style classroom – does the layout of the room and the ability of students to work together in larger groups have any impact on the performance of students? Looking at these data will allow the department to think about how to modify recitation sections (i.e.: smaller sections, different classroom layouts, etc.) to improve student learning. Also, see if there is a correlation between recitation attendance and performance in the class.

14) *CHY 122 General Chemistry II* – Sarah Lindahl (from Alice Bruce)

Semester and Year in Program: Spring, Year 2

Estimated Student Enrollment: 420

Number of MLAs: 13 (6 awarded and additional 7 MLAs funded by dean)

CITL engagement: Community of Practice, Summer Institute on Evidence-Based Teaching

Course Enhancements: Utilizing a mixture of traditional lecture and active learning activities. Clickers are a useful tool to gauge student understanding in real time and to facilitate student-student and student-faculty discussions. Students will be given time to work through a problem on their own before being encouraged to discuss their thought process and answer with classmates. During that time, students will have the opportunity to amend their initial responses via the polling software so I can gauge whether student discussion has improved learning of course topics. MLAs are used during both the lecture and recitation periods. The structure of lectures is such that students work on practice problems as individuals, as small groups, or as an entire class. The MLAs serve as a valuable resource when students are asked to work on problems as individuals or in small groups and together with the instructor, are able to give more individualized attention to students. MLAs also engage students in discussions about “why” the answer is

what it is or “how” they were able to arrive at this answer. The “how” and “why” is important and yet, are often overlooked by students.

Evidence of Impact: Currently in first semester of award and will be looking at evidence of impact Summer 2019. Having MLAs in both the lecture and recitation sections of CHY 122 has improved the performance of students on in-class assessments and has stimulated increased classroom participation. Students this semester scored, on average, 3-5% higher on their first exam than those in CHY 122 last spring. Students are frequently engaging with the MLAs during problem-solving time in lecture and are more willing to ask questions when they know there are additional, knowledgeable resources in the room that can provide more individualized attention than a single professor across 125 students.

Plan for Measuring Impact: Using a mandatory pre- and post-exam to assess student knowledge at the beginning and end of the course to see what learning gains have occurred. Will administer a mid-semester survey which strives to gauge student attitudes about various topics related to the course (i.e.: online homework, recitation periods, use of clickers in the classroom, effectiveness of recitation assistants, quality of course materials, availability and helpfulness of additional resources, etc.). Mid-semester surveys are used to determine what aspects of the course are serving the desired function and contributing to improved student performance and to see what modifications can be made to better serve students. Will compare assessment scores for students who have recitation in the active learning classroom relative to those that have recitation in the traditional lecture-style classroom – does the layout of the room and the ability of students to work together in larger groups have any impact on the performance of students? Looking at these data will allow the department to think about how to modify recitation sections (i.e.: smaller sections, different classroom layouts, etc.) to improve student learning. Also, see if there is a correlation between recitation attendance and performance in the class.

- 15) *CIE 331 Fundamentals of Environmental Engineering* – Jean MacRae  
Semester and Year in Program: Fall, Year 3  
Estimated Student Enrollment: 66  
Number of MLAs: 3  
CITL engagement: Instructional Designer support

Course Enhancements: “Flipped” format with videos online, quizzes prior to the first meeting on a given topic, and time in class is generally spent doing a quick recap of the important concepts and working problems. Students work at their own pace either independently or in groups. Incorporating more directed activities early on, such as warm up questions students can do in groups, that demonstrate the relevance of the day’s topic, and then dial it back so they are working more independently at the end of the semester. The addition of in-class work that may be collected for credit will encourage some students who treat the class as an online class to attend regularly. Each MLA is assigned three tables of students to answer questions as they arise in class, keep students on task (either related to short in-class activities or problem solving), and help with study skills and approaches. MLAs also critique the videos to help identify what needs to be updated or changed based on concepts they find difficult, superfluous, or needing additional examples. Will be incorporating a few more in-class activities to get students comfortable with the MLAs and the format, encourage better attendance, and promote more reflection on the learning process.

Evidence of Impact: The MLAs reported that things went well, and they were quite busy in class answering questions. Would like a higher percentage of students to “meet expectations” – meaning get a grade of C- or higher – in problem solving and applying basic math and science concepts in environmental engineering. These are computed based on the average grades of relevant exam questions. I would also like a higher proportion of students to self-report having improved problem solving and communications skills as well as awareness of sustainability issues in the student outcomes assessment they complete at the end of the semester.

- 16) *COS 125 Intro. to Problem Solving Using Computer Programming* – Penny Rheingans  
Semester and Year in Program: Fall, Year 1  
Estimated Student Enrollment: 92



Number of MLAs: 3

CITL engagement: Community of Practice

Course Enhancements: In the past, this has been a traditional lecture-only format and the DFW rate of this course has hovered around 50%. More modern pedagogy and learner support can bring about a substantial reduction in this rate, as well as better outcomes in self-efficacy, interest, and commitment to the major. The most concrete modification will be the addition of weekly labs where students could work on interactive exercises in a setting where immediate help is available. These labs will be smaller than the lecture, with 25 students per lab section. Will introduce pair and small group exercises in lecture, live-coding and interactive mini-quizzes in lecture, additional help hours in our student lab, peer panels and information sessions, and peer-led out-of-lecture activities to encourage supportive connections among students. MLAs will circulate during lecture to provide guidance and feedback during pair and small group exercises, partner with the graduate TA to supervise labs, staff the student lab during scheduled hours to provide support for programming project development, speak about their experiences and strategies in panels and information sessions, and organize out-of-lecture activities to support the formation of a supportive student cohort. Instructor will be working with a newly hired computer science lecturer to be involved with these course modifications in the future.

Evidence of Impact: None yet - Fall 2019 will be the first time with MLAs.

Plan for Measuring Impact: Desired outcomes include decreased DFW rate, increased progression to the next course (COS 225), steady (or better) performance of those who continue to COS 225, and increased progression to graduation in the major. OIR data will be used and compared to data from previous semesters. Surveys will also be used to gather information about students' amount of previous experience, self-efficacy, and satisfaction. Data will be analyzed in aggregate and disaggregated by gender and amount of previous experience. Typically, those from groups underrepresented in computing and/or without previous computing experience are more likely to leave the major. Historically, that has been true of women in the COS major at UMaine. Hope to raise performance and persistence for these groups to at least that of the overall group.

17) *COS 140 Foundations of Computer Science* – Roy Turner

Semester and Year in Program: Fall, Year 1

Estimated Student Enrollment: 114

Number of MLAs: 3

Course Enhancements: Large (~130 students) first-year required computer science course that has traditionally been run as a standard lecture class. Using TopHat, small-group problems, think-pair-share problems, and discussion/reaction group assignments will be assigned. MLAs and instructor can circulate to help the groups and to spark discussion, which is not possible with only one person. The MLAs, being past students of the course, will have a better idea of the difficulties of getting started and completing the problems given to the groups. In addition, the MLAs will assist in the recitation sections, which are predominantly problem-solving sessions, and they will be able to help with group assignments outside of class as well.

Evidence of Impact: None yet - Fall 2019 will be the first time with MLAs.

Plan for Measuring Impact: DFW rate in Fall 2019 and beyond will be compared with those of prior years - both the number of students who completed the course with a D or F grade and the number who withdrew. Students who withdraw will be contacted to determine why: was the course simply seen as too hard, were there extenuating circumstances and they will try again, did they decide to leave the major (perhaps as a result of what they learned about computer science in the course), etc. Teaching evaluations from Fall 2019 and beyond will be compared with prior years'. There are some questions that might give insight into the efficacy of the changes, for example, the question about how worthwhile it was to attend lectures. Instructor will also use survey instrument administered to Fall 2018 course (as part of the Introductory Course Environment – Faculty Learning Community) again in Fall 2019 and beyond and compare the data obtained (before and after). Department chair is teaching another introductory course (COS 125: Problem Solving

Using Computer Programming), and will coordinate assessment of the two courses. A single combined survey will be developed to gather information about the students, since there is a very large overlap between the two courses. Information will then be correlated with grades in the two courses to better understand the role of factors such as demographics, experience with computers, etc., in student achievement in both programming (COS 125) and non-programming (COS 140) aspects of computer science.

- 18) *COS 250 Discrete Structures* – Torsten Hahmann  
Semester and Year in Program: Fall, Year 6  
Estimated Student Enrollment: 40  
Number of MLAs: 3

Course Enhancements: Flipped classroom with very little direct lecturing and more time in class spent on addressing students' issues with the material and going over complex examples. To accomplish the goal, expanded the use of online quizzes to encourage students to complete the readings before class and to discuss only questions that students have difficulty with. Now students take a quiz every week and results are used to shape the next two lessons. Every week, students discussed the results of the quizzes among themselves, with MLAs helping out in guiding the discussion and confirming approaches. Classes themselves also constituted more hands-on activities, with MLAs helping small groups of students.

Evidence of Impact: Before/after results from two quizzes were compared and noticed significant improvements in questions that students performed poorly in the first quiz, but much better after discussing them in class (typically a 30-45% improvement in points for those questions). Even questions that were not discussed as the entire class, but students discussed among themselves, saw scores improve (typically in the range of 10-20%). Students have repeatedly expressed the great benefits of having the MLAs around – that they feel more comfortable approaching MLAs with questions and working through problems with them.

- 19) *EES 100 Human Pop. & the Global Environment* – Sarah Nelson and Katharine Ruskin  
Semester and Year in Program: Spring, Year 4  
Estimated Student Enrollment: 145  
Number of MLAs: 2  
CITL engagement: Pedagogy workshops (Ruskin)

Course Enhancements: Implemented clickers, and MLAs helped develop clicker questions. MLAs also facilitated group activities and discussion throughout the class. Finally, MLAs served as useful sounding boards and developed short lectures to practice their own teaching. By helping students take an active role in learning about how science is developed, students are provided with scientific habits of mind and a framework to help them develop scientific literacy.

Evidence of Impact: Students completed the Test of Scientific Literacy Skills (TOSLS) survey at the beginning and end of the course to gauge student learning gains in science and information literacy. Through the MST assistant and thesis work of Molly Picillo, it was learned that students gained skills, though the gains were modest (3 points). EES majors started at a slightly higher level of proficiency than non-majors. In addition, a quick analysis was run of whether a new assignment incorporated in spring 2018 (optional worksheets that are a bit more active than our multiple choice exams, e.g., filling in charts, drawing diagrams), led to student learning gains. Students did significantly better on test questions from lessons that had a worksheet, with about 10% more students getting it right. Students were polled about their thoughts on whether the worksheets were useful, and their perspective was mixed. Planning to use the worksheets again in spring 2019.

- 20) *ERS 102 Environmental Geology* – Amanda Olsen  
Semester and Year in Program: Fall, Year 2  
Estimated Student Enrollment: 78  
Number of MLAs: 3

Course Enhancements: Instructor has previously successfully used active learning techniques including classroom response systems, group work, and class discussion in a mid-sized (~45 students) introductory course. Circulating around the room during these times, moderating discussion and keeping students on task, was easy in a course this size. However, when this course was taught in Fall 2016 with 80 students, these techniques, especially the group work and discussion, were much harder to implement with one person. MLAs have helped to implement three active-learning strategies in the classroom: a) increased use of our classroom response system, b) increased and more effective classroom discussions, and c) the implementation of some inquiry-based laboratories.

Evidence of Impact: None yet – analyzing data in Summer 2019.

Plan for Measuring Impact: Instructor has taught this course eight times previously and has ample data on how students have performed in the course. Questions from previous final exams (which are not returned to students) will be used to assess whether important concepts were learned by more students in a classroom containing MLAs than without. Clicker questions from previous years will also be used to gather similar data. In-class writing assignments will be used to assess concepts that students find difficult and will be used to inform how to appropriately restructure teaching. A “multiple choice with explanation” format for some exam questions, will allow gathering of information on why students are responding in particular ways.

21) *FSN 330 Introduction to Food Science* – Balunkeswar Nayak

Semester and Year in Program: Fall, Year 4

Estimated Student Enrollment: 37

Number of MLAs: 2

Course Enhancements: Various student-center learning strategies and active engagement methods such as spending more time on one-on-one discussion, clarification of lecture topics, incorporating interesting topics in the published media i.e. news/articles/magazines in the class discussion and on the class/group project, creative thinking and initiation on problem solving. MLAs: (i) facilitate group discussions in the class, (ii) help engage student groups for the class group project, (iii) help the instructor with individual questions as students talk to one another during the lecture, and (iv) engage in review sessions for problem solving, respond to queries by the students, specifically students who scores poorly in previous exams, and review lectures/topics before the examinations and homework.

Evidence of Impact: Surveys were used to assess the impact of modification in the class. Assignments and related lab reports clearly showed the information on the improvement of learning in the class. Active engagement of students has a very positive impact on the student learning. Being the class is highly heterogenous, the modifications really helped the student in grade improvement, attendance, and learning of contents.

22) *MAT 116 Introduction to Calculus* – Ayesha Maliwal (from Jennifer Tyne)

Semester and Year in Program: Fall/Spring, Year 3

Estimated Student Enrollment: 188 (100 in fall and 88 in spring)

Number of MLAs: 4 (2 in fall and 2 in spring)

CITL engagement: Community of Practice, Pedagogy workshops, Instructional Designer support

Course Enhancements: MAT 116 presents a conceptual understanding of calculus. It has a large component for group work involving the use of a course pack, boards and technology. The course pack will be modified again next semester to include even more examples. A proposed change is 5-min “power videos” for students to watch on Blackboard before every class so that they can process the information better and come to class more prepared for the material we work through that day in groups. Ayesha will be working with CITL and the math department to develop this plan further. MLAs play a very important role in this class by supporting iclicker discussions and facilitating small group work, that is a key feature of this course. For the next semester as well, MLAs will help in class, hold a one-hour weekly help session outside of class and also spend one hour in a weekly planning meeting with the instructors.

Evidence of Impact: Award transfer from Jen Tyne to Ayesha Maliwal. No data analyzed yet.

Plan for Measuring Impact: Mid-semester evaluations as well as a pre- and post-concept inventory that was developed by Jennifer Tyne when MLAs were first introduced to the course. Comparing data collected from past semesters will provide helpful insight.

23) *MAT 122 Precalculus* – Timothy Boester and Todd Zoroya

Semester and Year in Program: Fall/Spring, Year 3 and 4 (two proposals)

Estimated Student Enrollment: 548 (350 in fall and 198 in spring)

Number of MLAs: 18 (9 in fall and 9 in spring)

CITL engagement: Community of Practice, Summer Institute on Evidence-Based Teaching (Zoroya)

Course Enhancements: MAT 122 has adopted an entirely new research-based curriculum focused on student understanding of function and covariation. This curriculum is designed for active learning classrooms, and thus the MLA program has enabled the course (on a department level) to support students' thinking and questions about the concepts in the course in a way which would not have been possible without MLA assistance.

Evidence of Impact: At one level, simply running the course with the new curriculum is evidence of the impact that MLAs are having, as it would be nearly impossible to implement the curriculum in an active learning class with only one instructor guiding the group work of 50-70 students per class. But the feedback from the students has also been highly effusive about the MLAs' contributions to the learning environment of the course. Looking at pre/post data from Pre-calculus Concept Inventory, the median score went from 6 to 9 questions correct out of 25. Increasing 3 questions does not seem like a lot, but normally when I give this assessment to non-Pathways classes students only get a one question increase or none at all. Looking at course evaluations for these 2 sections compared to the den section in the past, evaluations were lower for both Pathways sections. Not sure what this says but students are not accustomed to working on investigations in class. Based on data from the program survey, a lot of the results indicated that overall, students had a better experience in the course the more frequently they interacted with MLAs. What's more, they viewed the MLAs as more useful the more students interacted with them. Other interesting trends were students experiences and the locations they frequently interacted with MLAs. For example, students who attended review sessions and office hours had better experiences in the course.

24) *MAT 127 Calculus II* – Paula Drewniany

Semester and Year in Program: Fall/Spring, Year 3

Estimated Student Enrollment: 263 (110 in fall and 153 in spring)

Number of MLAs: 8 (4 in fall and 4 in spring)

Course Enhancements: MLAs guide students with group work in recitations (much better to have a 25:2 helper to student ratio than 25:1) and work with groups of students and individual students in the Math Lab. (The Math Lab is sometimes bursting during regular hours with MAT127 students working with MLAs and also during 'extra' hours' just for MLAs and MAT127 students.)

Evidence of Impact: In their mid- and end-of-semester evaluations students frequently comment on the helpfulness of the MLAs. These comments are given to the MLAs and they become more confident and often are inspired to be even better - clearly a learning experience for the MAT127 students and MLAs. Informal comments from students indicate that they appreciate having MLAs who understand Calculus II topics. There are some comments about particular MLAs indicating how 'great' they are! Based on data from the program survey, a lot of the results indicated that overall, students had a better experience in the course the more frequently they interacted with MLAs. What's more, they viewed the MLAs as more useful the more students interacted with them. Other interesting trends were students experiences and the locations they frequently interacted with MLAs. For example, students who attended review sessions and office hours had better experiences in the course.

25) *MET 440 Lean Six Sigma* – Brett Ellis

Semester and Year in Program: Spring, Year 3  
Estimated Student Enrollment: 29  
Number of MLAs: 2

Course Enhancements: MET 440 teaches STEM students how to solve real-world problems via an empirical problem-solving framework in which hypothesis testing, design of experiments, and statistical inference are utilized. Since it focuses on solving real-world problems, MET 440 attracts students from multiple STEM majors with disparate levels of initial statistical knowledge. After each student's incipient statistical knowledge has been identified via an initial concept inventory, the MLA interventions focus on closing knowledge gaps between those students having less-developed and more-developed statistical knowledge via seven (7), optional recitations. Control experiments were conducted in Fall 2016; MLA interventions were conducted in Spring 2018 and Spring 2019.

Evidence of Impact: Anecdotal evidence from the Spring 2018 and Spring 2019 offerings suggest that the seven (7) MLA interventions were effective at closing knowledge gaps. For example, a student lacking any statistical background scored the highest on Exam 1 in Spring 2018. Data (*e.g., Exam 1 results from the 3 offerings, initial concept inventory results during the 2nd and 3rd offerings, etc.*) will be analyzed in summer 2019 by a current MST student (who was also the Spring 2018 MLA) to quantify the impact of an MLA on leveling disparate levels of incipient knowledge. Although these MLA interventions were conducted within an upper level STEM course, the ability to level disparate incipient knowledge levels will be useful in multiple first-year college STEM courses in which students' disparate knowledge levels are a result of disparate high school experiences.

26) *NMD 106 Time-Based Media* – Joline Blais

Semester and Year in Program: Spring, Year 2  
Estimated Student Enrollment: 50  
Number of MLAs: 2

Course Enhancements: Many smaller New Media courses use student-centered, active learning instructional practices (collaborative learning, peer feedback, group projects, team discussions, student whiteboards, in-class uses of monitors to show /share student work, publication of work in online portfolio, etc.) which has resulted in increasing retention numbers. However, first-year foundation courses are large enrollment courses. The FIG-MLA resources will enable the course to 1) keep the same student-centered, active learning instructional practices seen in smaller classes in now larger classes, 2) improve some of the practices with more peer and mentoring support, 3) create links between NMD 106 and related upper level classes, and 4) further some developmental work in active research and service learning (SL) strategies already developed in the upper level class.

Evidence of Impact: None yet - Spring 2019 is the first time with MLAs.

Plan for Measuring Impact: Survey tool for end of semester was designed by MST student Adam Rogers in Summer 2018 to be used for first offering of course with MLAs in Spring 2019. Themes for survey include: knowledgeableability of the MLAs, frequency of interaction with the MLAs, personal ability, pedagogy of MLAs, and use of MLAs in the course. Analysis will begin Summer 2019.

27) *PHY 121 Physics for Eng. & Physical Scientists I* – Saima Farooq and MacKenzie Stetzer

Semester and Year in Program: Fall, Year 4  
Estimated Student Enrollment: 388  
Number of MLAs: 8

CITL engagement: Pedagogy workshops (Farooq), Facilitation of Pedagogy workshops (Stetzer)

Course Enhancements: The primary focus of the most recent proposal has been the introduction of MLAs in lecture to assist with active learning strategies (clicker questions, think-pair-share, group discussions) by facilitating discussion with students and assisting the instructor (both Stetzer and Farooq sections). While MLAs have also been helping facilitate the use of research-based instructional materials in recitations,

recitations will no longer be a primary MLA assignment going forward (thereby decreasing the total number of MLAs) due to Departmental funding constraints.

Evidence of Impact: The use of MLAs in lecture has been imperative in supporting the shift from two more-traditional lectures per week to three highly interactive lectures per week in which students explore and apply concepts and strategies more deeply during the lectures. Given that the 2018-2019 academic year is the first with this three-lecture format, pre-post assessment data are being used to compare learning gains under the new model with learning gains under the previous implementation. Classroom observation data (via COPUS) have indicated a significant shift in the use of class time between Fall 2017 and Fall 2018, with a noticeable increase in the employment of active engagement strategies.

28) *PHY 122 Physics for Eng. & Physical Scientists II* – Saima Farooq and MacKenzie Stetzer

Semester and Year in Program: Spring, Year 4

Estimated Student Enrollment: 306

Number of MLAs: 7

CITL engagement: Pedagogy workshops (Farooq), Facilitation of Pedagogy workshops (Stetzer)

Course Enhancements: The primary focus of the most recent proposal has been the introduction of MLAs in lecture to assist with active learning strategies (clicker questions, think-pair-share, group discussions) by facilitating discussion with students and assisting the instructor (both Stetzer and Farooq sections). While MLAs have also been helping facilitate the use of research-based instructional materials in recitations, recitations will no longer be a primary MLA assignment going forward (thereby decreasing the total number of MLAs) due to Departmental funding constraints.

Evidence of Impact: The use of MLAs in lecture has been imperative in supporting the shift from two more-traditional lectures per week to three highly interactive lectures per week in which students explore and apply concepts and strategies more deeply during the lectures. Given that the 2018-2019 academic year is the first with this three-lecture format, pre-post assessment data are being used to compare learning gains under the new model with learning gains under the previous implementation. Classroom observation data (via COPUS) have indicated a significant shift in the use of class time between Fall 2017 and Fall 2018, with a noticeable increase in the employment of active engagement strategies.

29) *PHY 262 Electronics Laboratory* – MacKenzie Stetzer

Semester and Year in Program: Spring, Year 7

Estimated Student Enrollment: 21

Number of MLAs: 2

CITL engagement: Facilitation of Pedagogy workshops (Stetzer)

Course Enhancements: In PHY 441 and (now) PHY 262, laboratory courses on analog electronics, MLAs have been essential in the deployment of research-based active-learning materials and instruction in interactive lectures and in the adoption of laboratory materials with increased focus on important laboratory skills such as troubleshooting, circuit design, etc. Both of these modifications require additional instructional support. Research has shown that students struggle with introductory electric circuits concepts, and many of these difficulties persist in upper-division electronics courses. After traditional instruction in such electronics courses, students often fail to develop a robust understanding of variety of important, function circuits (e.g., diode circuits, op-amp circuits, transistor circuits, and filters).

Evidence of Impact: The incorporation of MLAs into the course has assisted with the development and deployment of flexible resources for electronics instructions (e.g., short “microtutorials”, clicker questions, and other collaborative activities). While (in the last few years) pre- and post-data have been collected from a single instrument, the comparison isn’t too helpful since the majority of students enter the class with no knowledge of electronics. However, data have been collected on a variety of conceptually focused post-tests that have been administered at several different institutions (including ones with “stronger” student populations, as measured by various admissions metrics). It has been found that, on several questions, post-test performance of students in the course at UMaine exceeds that of students taking comparable (but

traditionally taught) courses at such “stronger” institutions. The solid performance on such questions can be linked to several of the MLA-supported activities in lecture (e.g., short tutorials on op-amp circuits). While still in the process of documenting improvements in relevant laboratory skills (e.g., at designing and testing circuits), laboratories have been introduced with increased emphasis on these skills because of the fact that MLAs assist the lead instructor in the laboratory environment. Informal feedback from the students about these new labs has been very positive, and work is currently being done to develop measures to more clearly ascertain their impact.

30) *PSY 230 Social Psychology* – Mollie Ruben

Semester and Year in Program: Fall/Spring, Year 1

Estimated Student Enrollment: 196 (96 in fall and 100 in spring)

Number of MLAs: 8 (4 in fall and 4 in spring)

CITL engagement: Instructional Designer support

Course Enhancements: Modify course to turn 2-3 lecture days into a classroom laboratory where students apply 1-2 of the concepts explained in the book, in prior lectures, or in a flipped classroom approach to a research study. Students will collect survey data or observational data in small groups with the help of the MLAs. Once data is collected, students will come back to class and pool their data. Analysis will be discussed and students will present a piece of the research study in written or presentation form. This hands-on approach will not only allow students to explore social psychology topics, but it will help them think critically about study design, hypothesis testing, and interpretation of data— all crucial components of upper level psychology courses and career success in and out of the psychology field. With the MLAs, more ground can be covered and instructor can better figure out who is struggling early in the course and intervene. The ability to discuss and think critically about the material will also benefit student learning and engagement with the material.

Evidence of Impact: None yet - Fall 2019 will be the first time with MLAs.

Plan for Measuring Impact: Mid-semester evaluations will be gathered to determine how the course modification have gone. Continued use of the same template evaluation that assesses their engagement with the material, what components of the course students want to do more of, what they want to do less of, and what they want to keep doing (adding the use of MLAs as a category) as well what they can be doing more of to help themselves in the course. Evaluation will also include open-ended response for students to comment on any aspects of the course, including the use of MLAs. These data will be used to both compare them to past semesters in terms of student engagement with the material and to inform future use of MLAs in the course. In addition, the same (or very similar) exams will be used to compare exam scores across semesters to determine if there are changes in overall learning.

31) *SMS 201 Marine Organisms* – Sara Lindsay

Semester and Year in Program: Spring, Year 4

Estimated Student Enrollment: 100

Number of MLAs: 2

Course Enhancements: Instructor began teaching the class in 2016, making a few changes to incorporate active learning in what had been a previously taught as a traditional lecture class. Supported by the FIG-MLA grant in 2017, course now includes more effective student-centered instruction, with two MLAs and a graduate TA helping students work through questions and quantitative skills activities in class. Having four instructors available to circulate in the fixed stadium seating of Murray 102 has made a big difference in the ability to engage students in thinking about the content. In addition, the MLAs and TA worked together to offer three optional study sessions each week. In these study sessions, MLAs reviewed lecture material, answered questions, and helped students organize and synthesize content.

Evidence of Impact: Outcomes have been similar each year since working with MLAs to increase student-centered teaching began. Notably, students who begin attending study sessions after doing poorly on the first prelim typically increase their scores on subsequent prelims (in some cases their scores improved by as much

as 20 points). The atmosphere in the class is very different than in previous years – students regularly ask questions during class and class attendance has increased. Perhaps because the study sessions are not required, and the students who most need help are not necessarily attending, it's not clear that the FIG-MLA modifications have made a significant impact on the D/F/W rate. Prior to beginning the FIG-MLA course modifications, the D/F/W rate was 33% (2016), and this declined to 29% (2017), but was 33% again in 2018. There are so many factors at play. In addition, the Test of Scientific Literacy Skills (TOSLS) was used as an independent pre- and post-test to evaluate any changes in students' quantitative literacy skills (especially related to graphs and working with data because that's what the course modifications are designed to address). Students in 2017 had gains on a key TOSLS question (making a graph), but students in 2018 had slight losses on the same question. Content knowledge scores (measured by comparing scores on matched questions from prelims to finals) do tend to show increases from the beginning to end of the semester. Analysis of all this still needs to be completed.

- 32) *SMS 300 Marine Ecology* – Paul Rawson  
Semester and Year in Program: Fall, Year 8  
Estimated Student Enrollment: 88  
Number of MLAs: 2

Course Enhancements: This course uses collaborative learning activities, with materials initially provided by Dr. Courtney Richmond, at Rowan University. Use an “expert topic”-based approach to cover material on trophic transfer and biomagnifications. This exercise follows the basic “jigsaw” technique for collaborative learning promoted by Elliot Aronson (<http://www.jigsaw.org/steps.htm>) wherein students are assigned background reading on a portion of a topic and asked to become an “expert.” The students then convene in small groups (5-6 students) during class and teach each other their respective topics. Each group of 6 students is then assigned a case study based on published field research and asked to apply their collective knowledge to an interpretation of the case. After 20-30 minutes of case preparation, each group is then asked to report out their findings to the class as a whole. Case study discussions include additional topics such as abiotic stress, competition, and habitat modification. The goal of the case study discussions is to cover a portion of each topic in more detail and by becoming an expert and teaching the topic to peers, the students become more proficient in the topic and their retention of the material is increased.

Evidence of Impact: Roughly 70% of the students like the active learning approach, 20-25% are tolerant of the approach, and 5% or so seem to dislike active learning and would prefer a lecture-based course. The MLAs (and graduate TAs) really enjoy the discussion-based approach as it provides them with an opportunity to strengthen their competency and is the easiest way to increase direct contact with students and challenge students to express their knowledge and confidence in the material. One thing that should be recognized is that science is a hands-on discipline; students gain competency by learning and immediately applying information. The learning circle-case study format allows for such application and provides the students an opportunity to test their abilities well in advance of being asked to apply their new skills and knowledge on an exam. In addition, the graduate TAs, undergraduate MLAs and instructor all find it much more enjoyable to teach in this format. The enthusiasm brought to the course provides for a much more dynamic learning environment.

- 33) *SMS 308 Ecology and Conservation of Marine Mammals* – Kristina Cammen  
Semester and Year in Program: Fall, Year 2  
Estimated Student Enrollment: 28  
Number of MLAs: 2  
CITL engagement: Community of Practice, Summer Institute on Evidence-Based Teaching

Course Enhancements: With MLAs, this course is modified to increase the amount of class time devoted to facilitated small- and large-group activities and discussion. In Fall 2018, modifications focused on 1) enhancing the use of jigsaw activities to promote scientific literacy; 2) introducing individual and group quizzes to promote spaced practice; and 3) enhancing student discussions of scientific literature and media to promote critical thinking and communication skills.



Evidence of Impact: First semester with MLAs in Fall 2018. These modifications were highly reviewed by students, and preliminary analysis showed that following their implementation, students performed significantly better on a high-order, figure-based exam question which has been consistently used for the past three years of teaching this class. Further data analysis will be completed in Summer 2019.

## Appendix A: List of all 2019-2020 FIG-MLA courses

Course	Instructor	Semester & Course Enrollment	Number of MLAs	Year in Program
AST 109 Introduction to Astronomy	David Batuski	Spring: 127	3	4
BIO 100 Basic Biology	Farahad Dastoor Julia McGuire	Fall: 752	12	4
BIO 200 Biology of Organisms	Farahad Dastoor Julia McGuire	Spring: 301	6	3
BIO 307 Introduction to Neuroscience	Kristy Townsend	Fall: 49	2	4
BIO 350 Concepts and Applications of Genetics	Ek Han Tan	Fall: 84 Spring: 114	6	8
BIO 480 Cell Biology	Kristy Townsend	Spring: 32	2	5
BMB 155 Genome Disc. II: From DNA to Genes	Sally Dixon Molloy	Spring: 36	2	6
BMB 207 Fundamentals of Chemistry	Jennifer Newell-Caito	Fall: 223	4	1
BMB 221 Organic Chemistry	Edward Bernard	Fall: 73	2	1
BMB 300 General Microbiology	Edward Bernard	Fall: 129	3	2
BMB 322 Biochemistry	Joshua Kelley	Spring: 128	5	3
CET 326 Soil Mechanics and Foundations	Meredith Kirkmann	Fall: 28	2	1
CHY 121 General Chemistry I	Sarah Lindahl	Fall: 300	6	2
CHY 122 General Chemistry II	Sarah Lindahl	Spring: 420	6	2
CIE 331 Fund. of Environmental Engineering	Jean MacRae	Fall: 66	3	3
COS 125 Intro to Problem Solving Using Computer Programming	Penny Rheingans	Fall: 92	3	1
COS 140 Foundations of Computer Science	Roy Turner	Fall: 114	3	1
COS 250 Discrete Structures	Torsten Hahmann	Fall: 40	3	6
EES 100 Human Pop. and the Global Env.	Sarah Nelson Katharine Ruskin	Spring: 145	2	4
ERS 102 Environmental Geology	Amanda Olsen	Fall: 78	3	2
FSN 330 Intro to Food Science	Balunkeswar Nayak	Fall: 37	2	4
MAT 116 Intro to Calc	Ayesha Maliwal	Fall: 100 Spring: 88	2	3
MAT 122 Precalculus	Timothy Boester Todd Zoroya	Fall: 350 Spring: 198	18	3
MAT 127 Calculus II	Paula Drewniany	Fall: 110 Spring: 153	8	3

MET 440 Lean Six Sigma	Brett Ellis	Spring: 29	2	3
NMD 106 Time-Based Media	Joline Blais	Spring: 50	2	2
PHY 121 Physics for Engineers and Physical Scientists I	Saima Farooq MacKenzie Stetzer	Fall: 388	8	4
PHY 122 Physics for Engineers and Physical Scientists II	Saima Farooq MacKenzie Stetzer	Spring: 306	7	4
PHY 262 Electronics Laboratory	MacKenzie Stetzer	Spring: 21	2	7
PSY 230 Social Psychology	Mollie Ruben	Fall: 96 Spring: 100	8	1
SMS 201 Marine Organisms	Sara Lindsay	Spring: 100	2	4
SMS 300 Marine Ecology	Paul Rawson	Fall: 88	2	8
SMS 308 Eco. and Cons. of Marine Mammals	Kristina Cammen	Fall: 28	2	2