First-Year Curricula Review: College of Natural Sciences, Forestry, & Agriculture

College of Natural Sciences, Forestry, & Agriculture

Office of the Executive Vice President for Academic Affairs & Provost
College-ready students come to campus academically prepared, with a positive mental and emotional outlook, and adequate financial resources. Students lacking one or more of these attributes are a retention risk. Unfortunately, there is a correlation between these three factors, which often compounds the challenges facing less-ready college students. This summary and our academic program reports explore the challenges, practices, and opportunities surrounding first-year success at UMaine.

I. Summary of Key Findings for majors within college
The College of Natural Sciences, Forestry, and Agriculture provides over 2,600 undergraduate students with 29 majors offered through eight schools, three departments and one interdisciplinary program. Over the past few years, some programs have assessed and modified their curricula to support student success and retention. Some programs are highly regimented and shuffling or delaying courses is not possible without delaying graduation beyond four years. The lack of curricular flexibility results from accreditation and/or professional degree requirements. A review of the common themes and issues that are barriers to student success are summarized in the section below.

a. DFWL courses in first-year curricula
Most of our bachelor’s degrees have first-year course requirements that include science, mathematics, and selected other courses with high DFWL grade rates. Many of these courses have DFWL rates among the highest at the University of Maine, and include the following: CHY 121/123, MAT 126, MAT 122, MAT 111, MAT 116, ECO 120, BIO 100, and PSY 100.

- The table shows the Fall 2017 DFWL percentage for the courses along with type of course (LEC = lecture, LAB = laboratory) and the total number of grades given.
- The DFWL percentages are for all students taking the course in the Fall of 2017, not just first-year students. Since grades normally increase as students move from first-year to upper-level standing, we can assume that first-year students did worse on average than shown in the table.
- CHY 121 (General Chemistry I) stands out as the largest impediment course for our students, with its very high DFWL rate. Unfortunately, more students were unsuccessful at this course than were successful.

<table>
<thead>
<tr>
<th>Course</th>
<th>Course Type</th>
<th>Total all grades</th>
<th>% D,F,W,L</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHY 121</td>
<td>LEC</td>
<td>1,009</td>
<td>53%</td>
</tr>
<tr>
<td>MAT 126</td>
<td>LEC</td>
<td>1,027</td>
<td>38%</td>
</tr>
<tr>
<td>MAT 122</td>
<td>LEC</td>
<td>711</td>
<td>35%</td>
</tr>
<tr>
<td>CHY 123</td>
<td>LAB</td>
<td>785</td>
<td>28%</td>
</tr>
<tr>
<td>MAT 111</td>
<td>LEC</td>
<td>291</td>
<td>28%</td>
</tr>
<tr>
<td>MAT 116</td>
<td>LEC</td>
<td>71</td>
<td>25%</td>
</tr>
<tr>
<td>PSY 100</td>
<td>LEC</td>
<td>1,262</td>
<td>21%</td>
</tr>
<tr>
<td>ECO 120</td>
<td>LEC</td>
<td>678</td>
<td>19%</td>
</tr>
<tr>
<td>BIO 100</td>
<td>LEC&amp;LAB</td>
<td>943</td>
<td>17%</td>
</tr>
</tbody>
</table>

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• Many faculty perceive a lack of mathematics preparedness in students.
• Our college finds the current math placement test to be lacking. At present students can be notified in the spring/early summer that they did not score high enough to enroll in their needed courses for the upcoming fall. The testing process does not offer an option for students to improve their math knowledge/skills.
• Many of our first-year students take one of the math courses listed above. A newer, positive development with math is the creation of MAT 116 which is a three credit introductory calculus course. For many of our majors, this course can replace MAT 126 which has a much higher DFWL rate (38% MAT 126 versus 25% MAT 116). However, a DFWL rate of 25% still means that 1 of 4 students are not successful.
• In addition to chemistry and mathematics, other courses have relatively high DFWL rates including PSY 100, ECO 120 and BIO 100.

b. Academic Readiness
For students entering the College of Natural Sciences, Forestry, and Agriculture, the Math SAT does a reasonable job of measuring academic preparedness. To illustrate this point, consider the example of two groups of fall 2017 first-year students enrolled in CHY 121 -- the bottom quartile versus the top quartile.

The top quartile has Math SAT scores equal to or above 630, while students in the lower quartile have Math SAT scores equal to or below 530. Of the fall 2017 incoming first-year students 43 from the upper group enrolled in CHY 121, while 22 from the lower group enrolled in CHY 121. This differential in enrollment is expected since more students in the top quartile would have met the CHY math co-requisites. Of the students in the top quartile, 70.2% were successful (30 of 43 finished with a C- or better), while in the lower quartile, only 4.5% were successful (1 of 22 finished with a C- or better).

c. Matching and Fit for Program
For some first-year students, the loss of a long-held career goal (e.g. veterinarian, biology pre-med track, nursing) is a risk associated with the rigor of STEM disciplines. Anecdotal evidence suggests that a good number of these students leave UMaine, although a cohort study has shown that many STEM majors change to non-STEM degrees at UMaine and do well academically.

d. Research and Engagement in First Year
Some first-year curricula are primarily comprised of pre-requisites and GenEds, as students need to master foundational material in order to take upper level courses in their discipline. These programs report a lack of engagement amongst their students, and that courses don’t seem relevant to first year students (SWK, ENH/SAG).

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e. Other Factors
Faculty have identified additional factors that influence first-year success and retention.

- The social and emotional readiness of more recent student cohorts seems markedly different than cohorts from 5-10 years ago.
- Large classes are a challenge for students, whether due to the temptation to skip class or the “distance” of the instructor, or lack of direct engagement in the discipline.
- Many students struggle with 8 a.m. classes, and first-year students often are the last to register, meaning they frequently must accept 8 a.m. classes to complete their schedule.

II. College-based initiatives to improve student success
Our college and our academic programs have implemented a number of initiatives focused on improving first-year student success.

a. Initiatives to improve student success in DFWL courses

- Chemistry
  - EES, WFCB, SMS, SECS are among programs who recently moved chemistry to the second year of the students’ program. EES also recently introduced PHY as an alternative to chemistry.
  - SBE will now give some students the option to delay chemistry a year and discuss the pros and cons of doing so with students during summer enrollment and orientation.
  - ANV will provide some students the option of delaying chemistry until a student’s second semester to give them more time to acclimate to the rigors of the program. Substituting the BMB chemistry two-semester sequence for the CHY chemistry two-semester sequence will be an option for students that decide not to pursue the pre-vet track.
  - The college has developed college academic preparedness materials with links to chemistry tutorials (and other subjects as well). We expand our “college readiness” campaign this summer. (Last summer’s materials located at [bit.ly/nsfaready](http://bit.ly/nsfaready)). We will especially target students who want/need to take CHY 121 and have math SAT scores at or below 530. This SAT threshold is due to the fact that only one of 22 of our first-year students with Math SAT scores at or below 530 earned a C- grade or better in CHY 121 fall 2017.

- Mathematics
  - Many programs have added MAT 116 as a replacement for MAT 122 and MAT 126 and have seen improvements in student success rates. The use of MAT 116 might expand if our programs knew that MAT 117 (the sequel to MAT 116) would be offered at least once per year.
  - The college’s summer preparedness efforts include several math modules ([bit.ly/nsfaready](http://bit.ly/nsfaready)) and incoming students are encouraged to study these modules.

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• **Maine Learning Assistants (MLAs)**
  o MLAs have been used in college classrooms for over 10 years. This academic year our college has spent $55,500 on MLAs, and many academic programs are committed to increasing the use of MLAs in the coming year, particularly for classes with 50+ students. The School of Biology and Ecology has documented that the use of MLAs has improved student performance, a finding supported in the literature. i
  o The current count of MLAs for the college is around 53, with roughly two-thirds of these students working in BIO 100. We are certain that the expansion of the use of MLAs in BIO 100 beginning the 2011-2012 academic year played a positive role in drastically reducing its rate of DFWL grades.
  o This level of MLA usage, while great for both the student workers and the student learners, has stretched department budgets.

• **Academic Improvement: Tutoring, and Peer Mentoring**
  o The college’s Academic Improvement Program (AIP) was begun spring 2016 to help first-year students who performed poorly their initial fall semester and had earned at least a 1.1 GPA. These students are on an academic contract and are required to visit the Academic Dean’s office weekly for sessions with a peer mentor to discuss homework, exams, study techniques, time management, work/school/life balance and more. This peer mentoring program has been shown to improve student GPA, etc. Program participant grades are statistically higher than a control group. The details of this program and the comparison analysis are contained as an appendix to this report (Summary and Analysis of the Academic Improvement Program (AIP)).
  o Our academic programs help orient students to academic and student support services on campus in their first-year seminar course and in advising sessions.
  o Several of our academic programs offer tutoring and/or mentoring programs, while others have prioritized mentor program development for AY 2019-2020.
  o Poor performance in the first exams in BIO 100 and BIO 200 are often an early warning sign for students that are struggling overall. The college will reinstitute the practice of obtaining and disseminating early exam results in BIO 100/200 to academic programs and faculty advisors so they can develop appropriate interventions for students at-risk.
  o The college hired a new staff member in January 2019 in part to develop programs for transfer, first-generation, and other at-risk students. She is building partnerships with the First-Year and Transfer Center, and TRIO SSS to target programming specific to vulnerable student populations in our college.
  o We have met with the First-Year and Transfer Center to develop an academic readiness session during Fall Welcome weekend 2019.

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b. **Matching and Fit for Program**

- ANV is developing outreach materials that discuss career opportunities in animal and veterinary sciences for whom the pre-vet concentration may no longer be an option due to students falling behind on the pre-veterinary requirements.
- Common first-year requirements in many degree programs in the college allow students to transition to different majors within the college.
- The college will prioritize development of strategies to assist students for whom a change of major would be a better fit to their academic strengths and interests. The goal will be to help students find the best major for them to try to keep the students at UMaine.

c. **Research and Engagement in First Year**

As a whole, our academic programs feel they provide substantial “hands on” learning opportunities for our students. There are opportunities to engage with faculty, students, alumni, and graduate students in their discipline. Below are examples of existing programs and planned programs.

- The National Howard Hughes Medical Institute Program in Phage Genomics (BMB 150/HON 150 and BMB 155/HON 155) is a learner-centered model for science education with its three classroom-laboratory components: fundamental research, active or student-centered learning, and student mentoring from teaching assistants and instructors. MBMS launched the "Phage Enrichment" program in fall of 2017 to support all students in the phage genomics course (first-year and transfer students) to enhance a sense of belongingness in Biochemistry, Microbiology, and Molecular and Cellular Biology majors. In this program, students meet with trained undergraduate and graduate teaching assistants to learn basic learning skills (i.e. study skills, time management), writing skills and to receive support in learning course-related content. In the MBMS retention report, an assessment of the program with supporting citations is given. In brief, UMaine Phage Genomics students score higher than national averages in all six psychological measures related to retention: Project Ownership (students feeling of engagement and ownership to their research project); Project Ownership Emotion (student has positive emotive response to their class research); Self-efficacy (student feels confident in function as a scientist); Science identity (student thinks about themselves as a scientist); scientific community values (student has affinity to the values of community; and Networking (students are talking about their research in both professional and personal networks).
- Programs that have noted a lack of first-year student engagement due to a lack of courses in the discipline will build connections to the curriculum in their first year success course (NFA 117 and equivalent) by linking students to research opportunities, graduate students, alumni, and professionals in the field.
- Cohort building in the first year is a point of pride and success for many of our programs. Many programs plan to strengthen existing programs. Others plan to emphasize cohort-building

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opportunities, particularly for curricula with significant pre-requisite courses and large sized classes.

- Summer and fall break Boot Camps: SBE, SFR, and SMS all run successful summer boot camps for first–year students. SBE and SMS have identified the need for additional funds to make this opportunity available for all of their first-year students, while other programs will explore development of a similar immersive experience for their first-year students.
- Some programs will explore adding a second semester course on college study skills, etc. (SBE, SECS)
- In recent years, the college created NFA 118, an orientation course for first-year and transfer students entering mid-year. Our programs do not offer mid-year orientation courses so this course helps students become acclimated to UMaine.
- Some programs will add sections of first-year seminar courses to reduce enrollment size and provide better faculty-student ratios (NUR, SBE)
- ECO may add a majors-only section of ECO 120, to better engage their new students.

d. Advising
The college prioritizes improved student success through quality advising, and is looking at ways to further boost retention through changes to our advising models in the future.

- Most of the college undergraduate program coordinators also serve as the advisor for first year-students and teach our first-year success seminar course (NFA 117 and equivalents), which provides weekly opportunities for faculty to check-in with students.
- The college is developing an advising survey for faculty, staff, and students and will distribute this spring and fall 2019. The results of the survey will inform a working group slated for the 2019-2020 academic year to investigate centralizing some non-academic advising functions for greater efficiency and to allow faculty more time to mentor students.
- The college is part of the Navigate Specialist Team on campus and will coordinate with the UMaine leadership team, college faculty, and staff to implement Navigate as an advising and early-alert system. We will use Navigate to replace our former use of the SignalVine and Mongoose texting programs for the purposes of reducing summer enrollment melt.

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Executive Summary

1. Key Findings

The first-year curriculum introduces core concepts and competencies to all students, regardless of their intended area of specialization, ensuring their preparedness for upper level courses in all areas of biology whether they adhere to their initial academic objectives or divert into an alternative path within the discipline. Basic foundations in biology, mathematics, and chemistry prepare students for upper level courses in biology.

If they have demonstrated mathematics competency, students have been encouraged in previous years to begin General Chemistry in their first year in order to increase their upper level course options, and allow them more time to repeat chemistry classes if necessary.

The first semester curriculum is challenging for many students. Although most succeed in introductory biology and calculus, 43% do not score sufficiently high in General Chemistry I to be able to move on to the second semester course. Biology, Zoology, and Botany BA students need to take two semesters of general chemistry, followed by a single semester of inorganic chemistry. A negative experience in their first semester of chemistry can prove extremely discouraging, and adversely affect their GPA. Data do not exist to determine how these same students might perform in General Chemistry I if they waited until sophomore year to take it. Nor does UMaine have a proven method to assess chemistry readiness. The current use of the math placement exam is clearly unreliable as a predictor of success in the first-year chemistry courses.

Because the organic chemistry, physics, and mathematics requirements of the BA are significantly less than those of the BS, but the General Education requirements are greater and require a higher level of mastery (more 200+ level courses), BA students may be better served by developing subject interests in humanities disciplines earlier in their program and delay chemistry until second year. However, many first-year students do not understand the purpose of the BA versus the BS and they frequently switch into the BS program before completion of their first semester. Additionally, 57% of students are able to succeed in chemistry in their first semester. These students should not be discouraged.

With 160 first-year students, who take primarily large enrollment courses in their first semester, cohort building is extremely difficult. The Schoodic Experience, a pre-semester “boot camp”, fosters comraderie among students, but fewer than half are able to attend.
2. **Key Components of Plan to Improve Student Success and Timeline for Implementation**

A proven method to accurately assess chemistry readiness is clearly needed. Until this is possible, a balance needs to be struck between the pressure for students to complete general chemistry in their first year and the reality that many of them will initially be unsuccessful in General Chemistry I.

Across disciplines, sophomore success rate in chemistry is higher than among first-years, controlling for math level. However, a first-year who is unprepared for chemistry does not gain such preparation, with the exception of mathematics skills, with our current curriculum. A pre-chemistry course in the first year (See Indiana University’s C103, Introduction to Chemistry Principles, as an example.) could be of tremendous benefit, particularly if students who begin CHY121, but find it too difficult, are allowed to switch into the pre-chemistry course in the same semester without financial consequence.

Until such time as an instrument is available to assess chemistry readiness, SBE will present students who meet minimal math standards (assessed through the existing math placement exam and SAT math score) the option of taking general chemistry in their first year or waiting until the second year. An information sheet will be prepared clearly outlining the pros and cons, benefits and risks of taking CHY121 in their first semester. Students will be provided the opportunity to discuss the decision with an SBE advisor.

**Timeline: April 2019**

First semester course choices should differ between BS and BA students, with BA students having greater emphasis on humanities courses, and less emphasis on chemistry. The fact that the majority of BA students switch into the BS prior to the start of the fall semester indicates that students have little understanding of which program is more appropriate for their aspirations. We propose to add an information sheet describing the differences to the pre-semester information sent to BA students.

**Timeline: Spring/summer 2019**

We propose to improve cohort building to provide strong, mutual support among students and help ease their early social and adjustment issues. We will increase our number of first-year seminar (NFA117) sections to nine, allowing us to enroll groups of eighteen students in the same NFA117 section and BIO100 lab section. BIO100 lab students work in groups and have much greater opportunities for personal interaction. The result will be an identifiable community of learners.

**Timeline: Fall 2019**
Biology, Botany, Zoology BA Program
Currently Recommended First Year Curriculum

| 1. Fall Semester                  | Cr. | 2. Spring Semester             | Cr. |
|--------------------------------umbnails|-----|--------------------------------|-----|
| BIO100 Basic Biology            | 4   | BIO200 Biology of Organisms    | 4   |
| CHY121 General Chemistry I      | 3   | CHY122 General Chemistry II    | 3   |
| CHY123 General Chemistry Lab I  | 1   | CHY124 General Chemistry Lab II| 1   |
| MAT116 or STS232 Introduction to Calculus or Principles of Statistical Inference | 3   | ENG101 College Composition     | 3   |
| NFA117 Issues and Opportunities | 1   | General Elective Requirement (Quant. Lit.) | 3 |
| General Education Requirement   | 3   | Elective                       | 1   |
| TOTAL                           | 15  | TOTAL                          | 15  |

1. **Required First-Year Curriculum**
   a. **Courses in the discipline**
      BIO100 and BIO200 are required as the introductory courses for the majors
   
   b. **Gen Ed Courses**
      BIO100 and BIO200 each meets Gen Ed requirements for Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences.

   c. **Other courses that meet major requirements**
      Additionally required courses include calculus or statistics, met by MAT116 or MAT126 or MAT136 or STS232 or WLE220 or PSY241, meeting Quantitative Literacy Requirements.

2. **What is the recommended first-year curriculum?**

   The recommended first-year curriculum includes a year of general chemistry, met by CHY121 & 123 and CHY122 & 124. Students are encouraged to complete ENG101 and their Quantitative Literacy Gen Ed requirement. They are further encouraged to explore courses in related majors (e.g., WLE, EES, BMB, FSN, PSE, SMS, CSD, AVS, KPE, SFR, SFA) if they are uncertain of their career or professional direction, or to take a course in an intended minor or a language, or to complete additional General Education requirements.
3. **Why is this the required/recommended first-year curriculum?**

   a. **What are the expected student-learning outcomes?**

   SBE’s Biology and Zoology programs require students to complete courses in five key areas: Cell and Molecular Biology, Genetics and Evolution, Physiology, Biodiversity, and Ecology and Behavior. Among these areas, students have tremendous choice among courses. As a result, the curricula ensures that every student will become a well-rounded biologist, while allowing the flexibility for each student, with the help of their academic advisor, to customize their program to their particular interests.

   A 2009 national conference of over five hundred biology faculty, sponsored by AAAS and NSF, *Vision and Change in Undergraduate Biology Education: A Call to Action*, identified core concepts considered essential to biological literacy and core competencies, the skills necessary to practice biology. The School of Biology and Ecology has been assessing and adjusting the curricula to integrate these core concepts and competencies.

   BIO100 and BIO200 in the first year introduces all of the core concepts and all but one of the core competencies. This final competency is addressed in BIO365 Evolution, a course required by all students, and recommended for sophomore year. Upper level courses reinforce the core concepts and competencies as students gain knowledge in SBE’s five key areas.

   The expected outcome is to provide the basic academic foundation needed for success in the upper level courses required for their chosen major. Additionally, this curriculum allows them to explore the discipline of biology and its many variations. Students are more likely to complete their degree requirements within four years if they are able to begin taking upper level biology courses in year two. Completing the mathematics requirement for the degree promotes adequate mathematical proficiency as required by upper level biology courses. ENG101 in the first year promotes strength in writing, which will enhance their performance in courses requiring written reports or term papers. Completion of general chemistry in year one is recommended for students who enter UM sufficiently proficient in mathematics, to insure they have sufficient chemistry background for upper level biology courses.

   Students who complete the recommended first-year curriculum have greater options among their 300 and 400-level biology courses. Beginning chemistry in year 1 provides a safety net by giving them more time to retake general chemistry should they encounter difficulty in their first year.

   BA students in the College of Natural Sciences, Forestry, and Agriculture have additional higher level General Education course requirements than BS students. Exploration among disciplines that are likely to fill General Education courses is desirable to enable students to later enroll in higher level courses in such disciplines that will be required of them. Exploration among other disciplines is further desirable in year 1 to encourage pairing the BA with logical minors to enhance career possibilities.
b. **How successful is this curriculum at producing expected outcomes**

(Data cited below were obtained from Institutional Research and apply only to Biology, Botany, and Zoology majors. Unless otherwise stated, data are based on students taking a course for the first time, not repeating.)

Most students successfully complete the introductory biology sequence and ENG101 in year one.

Of first years who arrive ready to take calculus or achieve this level in their first semester, 82% are able to complete MAT126 in the first year. These data pre-date the creation of MAT116. Anecdotally, student experience in MAT116 among Biology, Botany, and Zoology majors is more positive than for the MAT122 & MAT126 combination. We therefore anticipate an increase in the number of first years able to complete their calculus requirement by taking either MAT116 or 126 or 136, in year one.

BA students have the option to complete the mathematics requirement for their major with either calculus or statistics. First year success (defined as passing) in statistics (usually STS232) is greater than 90% among SBE first years, although numbers are low because most students in the school pursue calculus rather than statistics in their first year.

The overall success rate of all Biology, Botany, and Zoology majors in General Chemistry I, CHY121, in the first semester is 57%. Here “success” is defined as achieving a C-, the grade a student is required to achieve in order to register for General Chemistry II, CHY122. Of those first years who repeat CHY121 in their second semester, 65% are able to pass at a C- or higher level.

Some students enter UMaine at a math level below that needed to take CHY121 and they spend their first year building their math skills. These students take General Chemistry I & II in their second year. SBE advises that first year students who achieve a score less than 14 on the 2nd math placement exam should wait until sophomore year to begin General Chemistry. Typically, these students have a lower success rate in CHY121, achieving C- or higher at a rate of 39%. Only a quarter of sophomores repeat CHY121 in the spring semester, but they succeed at a rate of 86%.

Because SBE advises incoming first-year students with appropriate math skills to take CHY121 & 123 in their first semester, no data exist for how students in these specific majors, controlling for math level, might perform in General Chemistry if they waited until their second year to take it.

4. **What are the risks associated with this curriculum?**

The risks associated with the currently recommended first year curriculum is a high rate of DFLW’s and low GPAs. Students who have negative experiences from the combined intensity of General Chemistry, the introductory Biology, and mathematics may become discouraged.
General Chemistry has tended to serve unintentionally as a proving ground for our majors, with CHY121 being the course most likely to result in their switch into another major.

5. **In light of risk assessment, what are the alternative first-year curricula?**

An alternative to the currently recommended first year curriculum is to recommend students wait until their second year to take General Chemistry. Data across a variety of majors, controlling for math level, suggest that sophomore success in chemistry is greater than first-year success. This would allow them time to adapt to the increased academic pace of university courses and provide time to explore subjects of interest outside the requirements of their majors.

BA students need to follow a year of General Chemistry with a single semester of organic chemistry, and are required to take one semester of physics, in contrast with BS students who take two semesters each of organic chemistry and physics. Delaying General Chemistry until year two would not impede their ability to complete their degree in four years, and would expand opportunities to focus on General Education courses or courses for minors.

However, a significant number of first year students are able to succeed well in BIO100, calculus, and General Chemistry in their first year, and will be better prepared for and have greater choices among upper level courses because they have done so. These students should not be discouraged from pursuing these courses in their first year.

6. **What practices, resources, and/or tactics are in place to mitigate risks?**

Students have access to existing University academic resources including: TRIO, Tutor Program, Math Lab, Writing Center.

Maine Learning Assistants assisting in BIO100 and BIO200 and other courses have demonstrable impacts in improving student learning.

SBE offers an optional pre-semester “boot camp”, the Schoodic Experience, fostering comradery among incoming students, covering basic aspects of issues they may face on campus, and introducing them to advisors and some of the faculty.

All SBE first-semester first years are enrolled in an SBE-specific section of NFA117 to introduce them to opportunities and resources, discuss common issues faced by college students, and teach them about the requirements of their major. Topics are also covered as suggested by within-major retention literature and first-generation college student literature. NFA117 sections are led by the students’ academic advisors, providing weekly contacts.

All SBE students are encouraged to pursue career exploration with the assistance of the Career...
7. What additional steps can be taken to mitigate risk?

Mathematics preparedness among first years is frequently a barrier to success in their first-year courses. The current mathematics placement exam is designed to measure preparedness for math courses, not for chemistry. A means of testing preparedness for the mathematics specifically required in chemistry could improve determination of which students should be encouraged to wait for year two to begin the General Chemistry sequence. Determining any predictors of success in the biology/calculus/chemistry combination will permit more advantageous placement of first year students.

Early student engagement in mathematics review materials during the summer prior to their arrival on campus may improve performance in both mathematics and chemistry courses. These materials would need to be identified or created and provided to incoming students.

A second semester course, building upon NFA117, could benefit all students, especially with a heavy emphasis on career exploration. Students often do not fully absorb information about helpful resources, study skills, and course selection strategies until such time as they find themselves acutely in need of them. Following their first semester, students may gain an improved awareness of the feasibility of their goals. They may wish to explore some of the many reasonable alternatives earlier in their programs in order to adjust their programs if needed. The course could include academic support, the development of study groups, and personal/social support provided by the development of cohorts of students with similar interests and experiences.

With nearly 160 incoming first years every fall, cohort building is nearly impossible. Yet strong cohorts among students provide strong, mutual support unmatched by any other efforts, and help students resolve early social and adjustment issues. Our students frequently complain that they have few opportunities to get to know each other. While the Schoodic Experience helps in this respect, it remains open to fewer than half our incoming students and is an extra expense for them. We would like to be able to establish cohorts of students who are enrolled in the same NFA117 sections, same BIO100 lab sections (Personal interactions are much more common in lab courses than in lectures.), the same CHY123 sections, and the same ENG101 or other General Education course sections. Trained upper level student ambassadors could be assigned to cohorts as peer guides, with each cohort having the same academic advisor. Challenges to such a plan are the currently different enrollment caps in these courses (22 in NFA117 and ENG101, 18 in BIO100 labs, and 16 in CHY123), which may necessitate addition of course sections and adjustments to teaching loads. Current practices around reservation of seats in course sections would need to change to permit such block enrollments. An additional challenge will be identification, training, and paying of peer guides.
Executive Summary

1. Key Findings

The first-year curriculum introduces core concepts and competencies to all students, regardless of their intended area of specialization, ensuring their preparedness for upper level courses in all areas of biology whether they adhere to their initial academic objectives or divert into an alternative path within the discipline. Basic foundations in biology, mathematics, and chemistry prepare students for upper level courses in biology.

If they have demonstrated mathematics competency, students have been encouraged in previous years to begin General Chemistry in their first year in order to increase their upper level course options, and allow them more time to repeat chemistry classes if necessary.

The first semester curriculum is challenging for many students. Although most succeed in introductory biology and calculus, 43% do not score sufficiently high in General Chemistry I to be able to move on to the second semester course. Because Biology, Zoology, and Botany BS students need to take two semesters of general chemistry, followed by two semesters of inorganic chemistry, a negative experience in their first semester of chemistry can prove extremely discouraging, and adversely affect their GPA. Data do not exist to determine how these same students might perform in General Chemistry I if they waited until sophomore year to take it. Nor does UMaine have a proven method to assess chemistry readiness. The current use of the math placement exam is clearly unreliable as a predictor of success in the first-year chemistry courses.

With 160 first-year students, who take primarily large enrollment courses in their first semester, cohort building is extremely difficult. The Schoodic Experience, a pre-semester “boot camp”, fosters comradery among students, but fewer than half are able to attend.
2. Key Components of Plan to Improve Student Success and Timeline for Implementation

A proven method to accurately assess chemistry readiness is clearly needed. Until this is possible, a balance needs to be struck between the pressure for students to complete general chemistry in their first year and the reality that many of them will initially be unsuccessful in General Chemistry I.

Across disciplines, sophomore success rate in chemistry is higher than among first-years, controlling for math level. However, a first-year who is unprepared for chemistry does not gain such preparation, with the exception of mathematics skills, with our current curriculum. A pre-chemistry course in the first year (See Indiana University’s C103, Introduction to Chemistry Principles, as an example.) could be of tremendous benefit, particularly if students who begin CHY121, but find it too difficult, are allowed to switch into the pre-chemistry course in the same semester without financial consequence.

Until such time as an instrument is available to assess chemistry readiness, SBE will present students who meet minimal math standards (assessed through the existing math placement exam and SAT math score) the option of taking general chemistry in their first year or waiting until the second year. An information sheet will be prepared clearly outlining the pros and cons, benefits and risks of taking CHY121 in their first semester. Students will be provided the opportunity to discuss the decision with an SBE advisor.
Timeline: April 2019

We propose to improve cohort building to provide strong, mutual support among students and help ease their early social and adjustment issues. We will increase our number of first-year seminar (NFA117) sections to nine, allowing us to enroll groups of eighteen students in the same NFA117 section and BIO100 lab section. BIO100 lab students work in groups and have much greater opportunities for personal interaction. The result will be an identifiable community of learners.
Timeline: Fall 2019
Biology, Botany, Zoology BS Program
Currently Recommended First Year Curriculum

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<th>1. Fall Semester</th>
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<td>ENG101</td>
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</table>

1. **Required First-Year Curriculum**
   a. **Courses in the discipline**
      BIO100 and BIO200 are required as the introductory courses for the majors.

   b. **Gen Ed Courses**
      BIO100 and BIO200 each meets Gen Ed requirements for Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences.

   c. **Other courses that meet major requirements**
      Additionally required courses include calculus, met by MAT116 or MAT126 or MAT136, meeting Quantitative Literacy Requirements.

2. **What is the recommended first-year curriculum?**
   The recommended first-year curriculum includes a year of general chemistry, met by CHY121 & 123 and CHY122 & 124. Students are encouraged to complete ENG101. They are further encouraged to explore courses in related majors (e.g., WLE, EES, BMB, FSN, PSE, SMS, CSD, AVS, KPE, SFR, SFA) if they are uncertain of their career or professional direction, or to take a course in an intended minor or a language, or to complete additional General Education requirements.
3. Why is this the required/recommended first-year curriculum?

a. What are the expected student-learning outcomes?

SBE’s Biology and Zoology programs require students to complete courses in five key areas: Cell and Molecular Biology, Genetics and Evolution, Physiology, Biodiversity, and Ecology and Behavior. Among these areas, students have tremendous choice among courses. As a result, the curricula ensures that every student will become a well-rounded biologist, while allowing the flexibility for each student, with the help of their academic advisor, to customize their program to their particular interests.

A 2009 national conference of over five hundred biology faculty, sponsored by AAAS and NSF, *Vision and Change in Undergraduate Biology Education: A Call to Action*, identified core concepts considered essential to biological literacy and core competencies, the skills necessary to practice biology. The School of Biology and Ecology has been assessing and adjusting the curricula to integrate these core concepts and competencies.

BIO100 and BIO200 in the first year introduces all of the core concepts and all but one of the core competencies. This final competency is addressed in BIO365 Evolution, a course required by all students, and recommended for sophomore year. Upper level courses reinforce the core concepts and competencies as students gain knowledge in SBE’s five key areas.

The expected outcome is to provide the basic academic foundation needed for success in the upper level courses required for the major. Additionally, this curriculum allows them to explore the discipline of biology and its many variations. Students are more likely to complete their degree requirements within four years if they are able to begin taking upper level biology courses in year two. Completing the mathematics requirement for the degree promotes adequate mathematical proficiency as required by upper level biology courses. ENG101 in the first year promotes strength in writing, which will enhance their performance in courses requiring written reports or term papers. Completion of general chemistry in year one is recommended for students who enter UM sufficiently proficient in mathematics, to insure they have sufficient chemistry background for upper level biology courses.

Students who complete the recommended first-year curriculum have greater options among their 300 and 400-level biology courses. Beginning chemistry in year 1 provides a safety net by giving them more time to retake general chemistry should they encounter difficulty in their first year.

b. How successful is this curriculum at producing expected outcomes?

(Data cited below were obtained from Institutional Research and apply only to Biology, Botany, and Zoology majors. Unless otherwise stated, data are based on students taking a course for the first time, not repeating.)

Most students successfully complete the introductory biology sequence and ENG101 in year
Of first years who arrive ready to take calculus or achieve this level in their first semester, 82% are able to complete MAT126 in the first year. These data pre-date the creation of MAT116. Anecdotally, student experience in MAT116 among Biology, Botany, and Zoology majors is more positive than for the MAT122 & MAT126 combination. We therefore anticipate an increase in the number of first years able to complete their calculus requirement by taking either MAT116 or 126 or 136, in year one.

The overall success rate of all Biology, Botany, and Zoology majors in General Chemistry I, CHY121, in the first semester is 57%. Here “success” is defined as achieving a C-, the grade a student is required to achieve in order to register for General Chemistry II, CHY122. Of those first years who repeat CHY121 in their second semester, 65% are able to pass at a C- or higher level.

Some students enter UMaine at a math level below that needed to take CHY121 and they spend their first year building their math skills, allowing them to take General Chemistry I & II in their second year. SBE advises that first year students who achieve a score less than 14 on the 2nd math placement exam should wait until sophomore year to begin General Chemistry. Typically, these students have a lower success rate in CHY121, achieving C- or higher at a rate of 39%. Only a quarter of sophomores repeat CHY121 in the spring semester, but they succeed at a rate of 86%.

Since SBE advises incoming first-year students with appropriate math skills to take CHY121 & 123 in their first semester, no data exist for how students in these specific majors, controlling for math level, might perform in General Chemistry if they waited until their second year to take it.

4. **What are the risks associated with this curriculum?**

The risks associated with the currently recommended first year curriculum is a high rate of DFLW’s and low GPA. Students who have negative experiences from the combined intensity of in General Chemistry, the introductory Biology sequence, and mathematics may become discouraged. General Chemistry has tended to serve unintentionally as a proving ground for our majors, with CHY121 being the course most likely to result in their switch into another major.

5. **In light of risk assessment, what are the alternative first-year curricula?**

An alternative to the currently recommended first year curriculum is to recommend students wait until their second year to take General Chemistry. Data across a variety of majors, controlling for math level, suggest that sophomore success in chemistry is greater than first-year success. This would allow them time to adapt to the increased academic pace of university courses and provide time to explore subjects of interest outside the requirements of their majors.
However, a significant number of first year students are able to succeed well in BIO100, calculus, and General Chemistry in their first year, and will be better prepared for and have greater choices among upper level courses because they have done so. These students should not be discouraged from pursuing these courses in their first year.

6. What practices, resources, and/or tactics are in place to mitigate risks?

Students have access to existing University academic resources including: TRIO, Tutor Program, Math Lab, Writing Center.

Maine Learning Assistants assisting in BIO100 and BIO200 and other courses have demonstrable impacts in improving student learning.

SBE offers an optional pre-semester “boot camp”, the Schoodic Experience, fostering camaraderie among incoming students, covering basic aspects of issues they may face on campus, and introducing them to advisors and some of the faculty.

All SBE first-semester first years are enrolled in an SBE-specific section of NFA117 to introduce them to opportunities and resources, discuss common issues faced by college students, and teach them about the requirements of their major. Topics are also covered as suggested by within-major retention literature and first-generation college student literature. NFA117 sections are led by the students’ academic advisors, providing weekly contacts.

All SBE students are encouraged to pursue career exploration with the assistance of the Career Center.

7. What additional steps can be taken to mitigate risk?

Mathematics preparedness among first years is frequently a barrier to success in their first-year courses. The current mathematics placement exam is designed to measure preparedness for math courses, not for chemistry. A means of testing preparedness for the mathematics specifically required in chemistry could improve determination of which students should be encouraged to wait for year two to begin the General Chemistry sequence. Determining any predictors of success in the biology/calculus/chemistry combination will permit more advantageous placement of first year students.

Early student engagement in mathematics review materials during the summer prior to their arrival on campus may improve performance in both mathematics and chemistry courses. These materials would need to be identified or created and provided to incoming students.

A second semester course, building upon NFA117, could benefit all students, especially with a heavy emphasis on career exploration. Students often do not fully absorb information about helpful resources, study skills, and course selection strategies until such time as they find
themselves acutely in need of them. Following their first semester, students may gain an improved awareness of the feasibility of their goals. They may wish to explore some of the many reasonable alternatives earlier in their programs in order to adjust their programs if needed. The course could include academic support, the development of study groups, and personal/social support provided by the development of cohorts of students with similar interests and experiences.

With nearly 160 incoming first years every fall, cohort building is nearly impossible. Yet strong cohorts among students provide strong, mutual support unmatched by any other efforts, and help students resolve early social and adjustment issues. Our students frequently complain that they have few opportunities to get to know each other. While the Schoodic Experience helps in this respect, it remains open to fewer than half our incoming students and is an extra expense for them. We would like to be able to establish cohorts of students who are enrolled in the same NFA117 sections, same BIO100 lab sections (Personal interactions are much more common in lab courses than in lectures.), the same CHY123 sections, and the same ENG101 or other General Education course sections. Trained upper level student ambassadors could be assigned to cohorts as peer guides, with each cohort having the same academic advisor. Challenges to such a plan are the currently different enrollment caps in these courses (22 in NFA117 and ENG101, 18 in BIO100 labs, and 16 in CHY123), which may necessitate addition of course sections and adjustments to teaching loads. Current practices around reservation of seats in course sections would need to change to permit such block enrollments. An additional challenge will be identification, training, and paying of peer guides.
Executive Summary

1. Key Findings

The first-year curriculum introduces core concepts and competencies in basic biology, chemistry and mathematics to Medical Laboratory Sciences (MLS) students which are the building blocks for their subsequent course work. The curriculum for the MLS degree is driven by required course work for this professional degree and the prerequisite courses required to take those classes. If students are going to complete their degree in four years, they must complete all of their UMaine requirements in three years before they start their final year at an affiliated school with a practicum.

The first semester curriculum, particularly chemistry, is a challenge for many first year students. If they have demonstrated sufficient mathematics competency, students have been enrolled in the General Chemistry I in their first year. Although most MLS student succeed in introductory biology and calculus, 54% do not score sufficiently high enough in General Chemistry I to be able to move on to the second semester course. If they do not complete this requirement in their first year they need to finish this chemistry sequence in the summer in order to have the prerequisites to take the required courses in the second fall. Because MLS students need to take 16 credits of chemistry including two semesters of general chemistry, followed by one semester of inorganic chemistry, and a semester of biochemistry, a negative experience in their first semester of chemistry can prove extremely discouraging. If they do not complete the first year chemistry requirement by the start of the second year, they will be behind a year. This circumstance causes some students to switch majors. UMaine does not have a proven method to assess chemistry readiness. The current use of the math placement exam is clearly unreliable as a predictor of success in the first-year chemistry courses.

Cohort building in MLS in first year to carry on throughout the degree can be difficult. Due to difficulties in mathematics and chemistry in their first year, many students transfer out of the degree. Other students transfer into the degree after one too many semesters, and often come from majors with no STEM background. This small number but diverse group of students taking first year courses can make it difficult to build a cohort to support each other through the remaining classes. Often this does not occur until smaller third year courses.
2. Key Components of Plan to Improve Student Success and Timeline for Implementation

A proven method to accurately assess chemistry readiness is clearly needed to identify students who need remedial help before they start chemistry.

It would be useful for advisors to have access to early chemistry exam grades to encourage student to access the Tutor program while it will still have some effect. A pre-chemistry course in the first year, first semester could help students a great deal, particularly if students who begin CHY121, but find it too difficult, are allowed to switch into the pre-chemistry course in the same semester without financial consequence. This would still give students the spring semester and the summer to complete their chemistry requirements before their second year but also to provide them with some help to succeed in chemistry.

Until such time as a method is available to accurately assess chemistry readiness, MLS students who meet minimal math standards (assessed through the existing math placement exam and SAT math score) will be encouraged to register in chemistry in their first year. The consequences of delaying chemistry will be explained and they will be encouraged to register for a Tutor program in a STEM class in their first semester to gain study skills. Students will be provided the opportunity to discuss their decision on registering for chemistry with the MLS advisor.

Timeline: April 2019

We propose to improve cohort building to provide strong, mutual support among students and help ease their early social and adjustment issues, among both students who attend the Schoodic Experience and those who do not. We will increase our number of first-year seminar (NFA117) sections to nine, allowing us to enroll groups of eighteen students in the same NFA117 section and BIO100 lab section. We will try to put all incoming MLS students in the same cohort of BIO100 and NFA117. BIO100 lab students work in groups and have much greater opportunities for personal interaction. The result will be an identifiable community of learners.

Timeline: Fall 2019

SBE will explore the possibility of modifying the Orientation to Health Professions course (INT200) for second-semester first year students to include academic support, development of study groups, and exploration of health professions. MLS students will benefit by interacting with other health science oriented students early in their degree.

Timeline: Summer 2019
# Medical Laboratory Sciences BS Program
## Currently Recommended First Year Curriculum

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<td>BIO208 Anatomy and Physiology</td>
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<td>CHY121 General Chemistry I</td>
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<td>CHY122 General Chemistry II</td>
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<td>CHY123 General Chemistry I Laboratory</td>
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### 1. Required First-Year Curriculum
#### a. Courses in the discipline

BIO100 and BIO208 are required as the introductory courses for the major and more advanced classes.

#### b. Gen Ed Courses

BIO100 and BIO208 each meets Gen Ed requirements for Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences. ENG 101 meets early English requirement. MAT116 or MAT122 or MAT126, which also meets Quantitative Literacy Requirements.

#### c. Other courses that meet major requirements

CHY121/123 and CHY122/124 are required courses for the major. BMB280 is also a requirement for the major and necessary for students to take advanced biology classes. The requirement for an college credit math course is met by MAT116 or MAT122 or MAT126.
2. **What is the recommended first-year curriculum?**

   The recommended first-year curriculum includes a year of biology met by BIO100 and BIO208 and a year of general chemistry, met by CHY121 & 123 and CHY122 & 124 and BMB280. Students are encouraged to complete ENG101 and one of their advanced math requirements.

3. **Why is this the required/recommended first-year curriculum?**

   a. **What are the expected student-learning outcomes?**

   Of the recommended first-year courses, there are no courses besides CHY121 and MAT classes, whose success rates (>C-) are below 75%. For the MLS recommended courses, using MLS specific course data when available, and overall course SBE data when MLS data not available, student success rates are as follows: BIO 100 (92%), CHY 121 (46%), MAT 116 (75%), CHY 122 (75%), ENG 101 (100%), BMB280 (100%).

   Please note that MLS curriculum was recently updated to help students. Prior to last year, the curriculum required MAT 122 Precalculus or MAT 126 Calculus I, but this year also began accepting MAT 116 Introduction to Calculus to fulfill the math requirement. The overall success rate for Fall 2017 for these courses were 62% for MAT 126, and 75% for MAT 116. This curriculum change should help with MLS first year retention.

   If students are going to complete their degree in four years, they must complete all of their UMaine requirements in three years before they start their final year at an affiliated school with a practicum. The curriculum of the MLS degree is driven by required course work for this professional degree and the prerequisite courses required to take those classes. One of these requirements is 16 credits of chemistry including organic chemistry and biochemistry and a minimum GPA of 2.5 in their science and math courses.

   The expected outcome of the first year curriculum is to prepare students for success in their next level of required courses for their MLS major. One year of biology and one year of chemistry are pre-requisites for general microbiology (BMB300/305) and one year of chemistry is the pre-requisite for organic chemistry BMB221/222 or CHY251/253. These courses must be taken in the fall of the second year as they are pre-requisites for courses students need to take in the spring of their second year. Completing the mathematics requirement for the degree promotes adequate mathematical proficiency as required by upper level biology courses. ENG101 in the first year promotes strength in writing, which will enhance their performance in courses requiring written reports or term papers.
b. How successful is this curriculum at producing expected outcomes?

(Data cited below was obtained from Institutional Research and applies only to MLS majors. Data is based on students taking a course for the first time, not repeating.)

Students who complete the recommended first-year curriculum are able to proceed to their second year courses of microbiology and organic chemistry, biochemistry, immunology, and infectious diseases. Most students successfully complete (over 90% get >C-) in the first year of biology requirements (BIO100 and BIO208) and BMB280.

Approximately 50% of first year students complete the CHY121/123 requirement of >C-. Most students are able to successfully complete this requirement in their second attempt.

4. What are the risks associated with this curriculum?

If students do not successfully complete the full year of biology and full year of chemistry before fall of their second year, they must retake these courses in their second year and are a year behind in their degrees. The course work of the MLS degree is very structured and has a set sequences in which most courses can be taken to meet the pre-requisite requirements before when the advanced class is offered. A DFW in CHY121 typically results in students retaking this course in the spring semester of their first year and then taking CHY122/124 or their equivalents in the summer. Some students switch out of the MLS major after failing CHY121 with the realization this is the first of many chemistry courses required in this major. CHY121 is unintentionally acting as a test of the interest and sometimes ability of students who want to pursue the MLS major.

5. In light of risk assessment, what are the alternative first-year curricula?

There is none if the student wishes to complete their degree within four years without taking summer courses. Summer courses are only regularly available for the introductory level courses and so are not an option past first year.

6. What practices, resources, and/or tactics are in place to mitigate risks?

Students have access to existing University academic resources including: TRIO, the Tutor Program, Math Lab, Writing Center.

Maine Learning Assistants assisting in BIO100 and BIO208 and other courses have demonstrable impacts in improving student learning.

SBE offers an optional pre-semester “boot camp”, the Schoodic Experience, fostering comradery among incoming students, covering basic aspects of issues they may face on campus, and introducing them to advisors and some of the faculty.

All SBE first-semesters first years are enrolled in an MLS-specific section of NFA117 to introduce them to opportunities and resources, discuss common issues faced by college students, and teach them about the requirements of their major. Topics are also covered as suggested by within-major retention literature and first-generation college student literature. The weekly
NFA117 sections are led by the first year student advisors with the MLS advisor helping with sessions covering MLS degree requirements.

All MLS students meet with the MLS academic advisor to discuss the profession, career options and the curriculum for the degree.

7. **What additional steps can be taken to mitigate risk?**

   Preparedness for Chemistry is a major problem among many MLS students. The prior practice of matching math placement scores with chemistry preparedness did not appear to be complete accurate (anecdotal evidence) indication of how students would do. A test of chemistry preparedness early enough in the summer to give student time to be involved in remedial online materials could improve first year chemistry outcomes. A study on what difficulties most students are having with chemistry would be helpful.

   Automatic enrollment of students with lower grades on a chemistry preparedness test or math test in a tutor program during first semester may also help. It would be useful for advisors to have access to early chemistry exam grades to encourage student to access the Tutor program while it will still have some effect. Often students are reluctant to engage with the Tutor program until they are struggling.

   A one credit course is study techniques and careers in the stem professions for all incoming first year students interested in health professions could provide study techniques, group students in to study groups by their interests or courses and support in their majors. This course could also introduce students to various health professions that they may find better suit their interests. Many students know they want to work in the health professions but think only various areas of nursing and medical degrees are their options. Focusing students on a profession that fits their interests and skill earlier on could improve retention from students dropping out after realizing they are not interested in the main medical professions. This could improve retention in various health profession degrees.
Executive Summary

1. Key Findings

The first-year curriculum introduces core concepts and competencies to all students, regardless of their intended area of specialization, ensuring their preparedness for upper level courses in all areas of biology whether they adhere to their initial academic objectives or divert into an alternative path within the discipline. Basic foundations in biology, mathematics, and chemistry prepare students for upper level courses in biology and put them on track to take their Medical School Admissions Test (MCAT) at the appropriate time.

If they have demonstrated sufficient mathematics competency, students have been encouraged in previous years to begin General Chemistry in their first year in order to increase their upper level course options. This has also allowed them more time to repeat chemistry classes if necessary, and to be ready to take the MCAT exam on time to avoid the necessity of a gap year between graduation from UMaine and entering medical school.

The first semester curriculum is challenging for many students. Although most succeed in introductory biology and calculus, 43% do not score sufficiently high in General Chemistry I to be able to move on to the second semester course. Because pre-medical students need to take two semesters of general chemistry, followed by two semesters of inorganic chemistry, and a semester of biochemistry, a negative experience in their first semester of chemistry can prove extremely discouraging, and adversely affect their GPA. (Medical schools include all attempts at pre-requisite courses in their GPA calculations, not simply the last attempt.) Data do not exist to determine how these same students might perform in General Chemistry I if they waited until sophomore year to take it. Nor does UMaine have a proven method to assess chemistry readiness. The current use of the math placement exam is clearly unreliable as a predictor of success in the first-year chemistry courses.

With 160 first-year students, who take primarily large enrollment courses in their first semester, cohort building is extremely difficult. The Schoodic Experience, a pre-semester “boot camp”, fosters comradery among students, but fewer than half are able to attend.
2. **Key Components of Plan to Improve Student Success and Timeline for Implementation**

A proven method to accurately assess chemistry readiness is clearly needed. Until this is possible, a balance needs to be struck between the pressure for pre-medical students to complete general chemistry in their first year and the reality that many of them will initially be unsuccessful in General Chemistry I.

Across disciplines, sophomore success rate in chemistry is higher than among first-years, controlling for math level. However, a first-year who is unprepared for chemistry does not gain such preparation, with the exception of mathematics skills, with our current curriculum. A pre-chemistry course in the first year (See Indiana University's C103, Introduction to Chemistry Principles, as an example.) could be of tremendous benefit, particularly if students who begin CHY121, but find it too difficult, are allowed to switch into the pre-chemistry course in the same semester without financial consequence.

Until such time as an instrument is available to assess chemistry readiness, SBE will present students who meet minimal math standards (assessed through the existing math placement exam and SAT math score) the option of taking general chemistry in their first year or waiting until the second year. An information sheet will be prepared clearly outlining the pros and cons, benefits and risks of taking CHY121 in their first semester. Students will be provided the opportunity to discuss the decision with an SBE advisor.

**Timeline: April 2019**

We propose to improve cohort building to provide strong, mutual support among students and help ease their early social and adjustment issues. We will increase our number of first-year seminar (NFA117) sections to nine, allowing us to enroll groups of eighteen students in the same NFA117 section and BIO100 lab section. BIO100 lab students work in groups and have much greater opportunities for personal interaction. The result will be an identifiable community of learners.

**Timeline: Fall 2019**

SBE will explore the possibility of modifying the Orientation to Health Professions course (INT200) for second-semester first year students to include academic support, development of study groups, and exploration of health professions. Pre-medical students will benefit by earlier refinement of their goals and understanding the requirements for entering medical school.

**Timeline: Summer 2019**
1. **Required First-Year Curriculum**
   
   a. **Courses in the discipline**
   
   BIO100 and BIO200 are required as the introductory courses for the majors.

   b. **Gen Ed Courses**
   
   BIO100 and BIO200 each meets Gen Ed requirements for Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences. SOC101 or PSY100 meet Gen Ed requirements for Social Context and Institutions.

   c. **Other courses that meet major requirements**
   
   Additionally required courses include calculus, MAT116 or MAT126 or MAT136, meeting Quantitative Literacy Requirements.

2. **What is the recommended first-year curriculum?**

   The recommended first-year curriculum includes a year of general chemistry, met by CHY121 & 123 and CHY122 & 124. Students are encouraged to complete ENG101. They are further encouraged to explore courses in related majors (e.g., WLE, EES, BMB, FSN, PSE, SMS, CSD, AVS, KPE, SFR, SFA) if they are uncertain of their career or professional direction, or to take a course in an intended minor or a language, or to complete additional General Education requirements, or to complete an English literature course at 200+ level. PSY100 and/or SOC101 are
3. Why is this the required/recommended first-year curriculum?

a. What are the expected student-learning outcomes?

SBE’s Biology and Zoology programs require students to complete courses in five key areas: Cell and Molecular Biology, Genetics and Evolution, Physiology, Biodiversity, and Ecology and Behavior. Among these areas, students have tremendous choice among courses. As a result, the curricula ensure that every student will become a well-rounded biologist, while allowing the flexibility for each student, with the help of their academic advisor, to customize their program to their particular interests.

A 2009 national conference of over five hundred biology faculty, sponsored by AAAS and NSF, *Vision and Change in Undergraduate Biology Education: A Call to Action*, identified core concepts considered essential to biological literacy, and core competencies, the skills necessary to practice biology. The School of Biology and Ecology has been assessing and adjusting the curricula to integrate these core concepts and competencies.

BIO100 and BIO200 in the first year introduces all of the core concepts and all but one of the core competencies. Students are exposed to the remaining competency in BIO365, Evolution, a course required by all students, and recommended for sophomore year. Upper level courses reinforce the core concepts and competencies as students gain knowledge in SBE’s five key areas.

The expected outcome is to provide the basic academic foundation needed for success in the upper level courses required for their chosen major. Additionally, this curriculum allows them to explore the discipline of biology and its many variations. Students are more likely to complete their degree requirements within four years if they are able to begin taking upper level biology courses in year two. Completing the mathematics requirement for the degree promotes adequate mathematical proficiency as required by upper level biology courses. ENG101 in the first year promotes strength in writing, which will enhance their performance in courses requiring written reports or term papers. Completion of general chemistry in year one is recommended for students who enter UM sufficiently proficient in mathematics, to insure they have sufficient chemistry background for upper level biology courses. Course choices, including PSY100 and SOC101, are further intended to help students begin to prepare for medical college admissions testing.

Students who complete the recommended first-year curriculum have greater options among their 300 and 400-level biology courses. Beginning chemistry in year 1 provides a safety net by giving them more time to retake general chemistry should they encounter difficulty in their first year.
b. **How successful is this curriculum at producing expected outcomes?**

(Data cited below were obtained from Institutional Research and apply only to Biology, Botany, and Zoology majors. Unless otherwise stated, data are based on students taking a course for the first time, not repeating.)

Most students successfully complete the introductory biology sequence and ENG101 in year one.

Of first years who arrived ready to take calculus or achieve this level in their first semester, 82% are able to complete MAT126 in the first year. This data pre-dates the creation of MAT116. Anecdotally, student experience in MAT116 among Biology, Botany, and Zoology majors is more positive than for the MAT122 & MAT126 combination. We therefore anticipate an increase in the number of first years able to complete their calculus requirement by taking either MAT116 or 126 or 136 in year one.

The overall success rate of all Biology, Botany, and Zoology majors (BA and BS combined, any concentration or no concentration) in General Chemistry I, CHY121, in the first semester is 57%. Here “success” is defined as achieving a C-, the grade a student is required to achieve in order to register for General Chemistry II, CHY122. Of those first years who repeat CHY121 in their second semester, 65% are able to pass at a C- or higher level.

Some students enter UMaine at a math level below that needed to take CHY121 and they spend their first year building their math skills. These students take General Chemistry I & II in their second year. SBE advises that first year students who achieve a score less than 14 on the 2nd math placement exam should wait until sophomore year to begin General Chemistry. Typically, these students have a lower success rate in CHY121, achieving C- or higher at a rate of 39%. Only a quarter of sophomores repeat CHY121 in the spring semester, but they succeed at a rate of 86%.

Because SBE advises incoming, math-ready, first-year students to take CHY121 & 123 in their first semester, no data exist for how students in these specific majors, controlling for math level, might perform in General Chemistry if they waited until their second year to take it.

4. **What are the risks associated with this curriculum?**

The risks associated with the currently recommended first year curriculum are a high rate of DFLW’s and low GPAs. Students who have negative experiences from the combined intensity of General Chemistry, the introductory Biology sequence, and mathematics may become discouraged. General Chemistry has tended to serve unintentionally as a proving ground for our majors, with CHY121 being the course most likely to result in their switch into another major.

For students who are planning to enter medical school, these associated risks may, in some cases, serve a positive purpose. In medical school, students will face intense academic pressures beyond what they currently experience in their first year in the biology curriculum at UMaine, no matter what course combination they take here. Because successful admission to medical school requires a high GPA, students who cannot achieve high grades in their first year
or who become overwhelmed by the academic intensity will still have plenty of time to
determine a new academic or career path. Normally, such a change in major can be completed
in sophomore, junior, and senior year, allowing them to graduate within four years.
Additionally, if students with weaker academic skills are made aware of deficits early, they can
plan for gap years, and build in additional courses and projects that may enhance their medical
school applications.

5. **In light of risk assessment, what are the alternative first-year curricula?**

For pre-medical studies students wishing to enter medical school in the fall following graduation
from UMaine, the MCAT (Medical College Admission Test) is taken in summer following junior
year and students apply for medical school in fall of senior year. To meet prerequisites
commonly required by medical schools, students need to take a full year of general chemistry, a
full year of organic chemistry, a full year of physics, and a semester each of biochemistry and
calculus. These courses, as well as a semester each of psychology, sociology, and English
literature (to improve reading comprehension), should be completed by the end of junior year
to provide adequate preparation for the MCAT exam. Students who do not complete a year of
general chemistry or physics in year one will have to combine either general chemistry and
physics, or physics and organic chemistry within the same semesters in a single year unless they
take one of these sequences over a summer. Most students find it necessary to take the second
semester of organic chemistry and biochemistry in the same semester.

If a student does not complete the above listed courses by the end of junior year in preparation
for the MCAT, they will need a gap year between graduation from UMaine and entering medical
school to complete the MCAT and their medical school applications.

An alternative to the currently recommended first year curriculum is to recommend students
wait until their second year to take General Chemistry. Data across a variety of majors,
controlling for math level, suggest that sophomore success in chemistry is greater than first-year
success. This would allow them time to adapt to the increased academic pace of university
courses and provide time to explore subjects of interest outside the requirements of their
majors. Such students who wish continue in the pre-medical studies pathway need to decide if
they will take a gap year prior to medical school, which can be an advantage if they obtain a job
or internship involving patient contact. Another option is to take either the general chemistry,
organic chemistry, or physics sequence during a summer in order to be ready to take the MCAT
by summer after junior year.

6. **What practices, resources, and/or tactics are in place to mitigate risks?**

Students have access to existing University academic resources including: TRIO, Tutor Program,
Math Lab, Writing Center.
Maine Learning Assistants assisting in BIO100 and BIO200 and other courses have demonstrable impacts in improving student learning.

SBE offers an optional pre-semester “boot camp”, the Schoodic Experience, fostering camaraderie among incoming students, covering basic aspects of issues they may face on campus, and introducing them to advisors and some of the faculty.

All SBE first-semester first years are enrolled in an SBE-specific section of NFA117 to introduce them to opportunities and resources, discuss common issues faced by college students, and teach them about the requirements of their major. Topics are also covered as suggested by within-major retention literature and first-generation college student literature. NFA117 sections are led by the students’ academic advisors, providing weekly contacts.

All SBE students are encouraged to pursue career exploration with the assistance of the Career Center. The Career Center provides health professions counseling for pre-med students, including frank discussion about their skills and life goals and the conformity of these to various medical professions, researching different medical schools, and advising about internships and activities that can strengthen medical school applications.

7. **What additional steps can be taken to mitigate risk?**

Mathematics preparedness among first years is frequently a barrier to success in their first-year courses. The current mathematics placement exam is designed to measure preparedness for math courses, not for chemistry. A means of testing preparedness for the mathematics specifically required in chemistry could improve determination of which students should be encouraged to wait for year two to begin the General Chemistry sequence.

Early student engagement in mathematics review materials during the summer prior to their arrival on campus may improve performance in both mathematics and chemistry courses. These materials would need to be identified or created and provided to incoming students.

UMaine currently offers an Orientation to Health Professions course (INT200). Students frequently find their course requirements and schedule do not allow them to take this course. Those who take this course typically do so in sophomore year. The course provides important learning about career paths in health professions, including some that may not require medical school, as well as the steps necessary, both course work and other types of experience, to be accepted and succeed in medical school. We believe a modification of this course could benefit second-semester first year students. These students need to become aware of the feasibility of their goals or explore some of the many reasonable alternatives earlier in their programs in order to adjust their programs if needed. The modified course could include academic support, the development of study groups, and personal/social support provided by the development of cohorts of students with similar interests and experiences.

With nearly 160 incoming first years every fall, cohort building is nearly impossible. Yet strong cohorts among students provide strong, mutual support unmatched by any other efforts, and help students resolve early social and adjustment issues. Our students frequently complain that
they have few opportunities to get to know each other. While the Schoodic Experience helps in this respect, it remains open to fewer than half our incoming students and is an extra expense for them. We would like to be able to establish cohorts of students who are enrolled in the same NFA117 sections, same BIO100 lab sections (Personal interactions are much more common in lab courses than in lectures.), the same CHY123 sections, and the same ENG101 or other General Education course sections. Trained upper level student ambassadors could be assigned to cohorts as peer guides, with each cohort having the same academic advisor.

Challenges to such a plan are the currently different enrollment caps in these courses (22 in NFA117 and ENG101, 18 in BIO100 labs, and 16 in CHY123), which may necessitate addition of course sections and adjustments to teaching loads. Current practices around reservation of seats in course sections would need to change to permit such block enrollments. An additional challenge would be identifying, training, and paying upper level student ambassadors to serve as peer guides.
Executive Summary

1. Key Findings

While some CSD first-year students enroll in UMaine courses with somewhat low success rates (PSY 100, BIO 100), CSD students have done better than average in these courses. A very small percentage of students take MAT 122, MAT 126, and ECO 120, ANT 100 – with mixed success in these courses. Our overall first-year retention rate of 88% (four year average) is high demonstrating that our students are generally successful. In addition our students are above the national average in the national exams, showing our students are meeting the desired learning outcomes.

2. Key Components of Plan to Improve Student Success and Timeline for Implementation

Since our students are meeting desired outcomes and have a high first-year retention rates, we feel only minor changes (fine-tuning) is required at this point.
Communication Sciences and Disorders B.S. Program
Recommended First Year Curriculum

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<td>Introduction to Communication &amp; Sciences Disorders (required)</td>
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1. Required First-Year Curriculum
   a. Courses in the discipline

   The courses required in our department for the first year are CSD 100 Foundations of Communication Sciences and Disorders and CSD 130 Introduction to Communication Sciences and Disorders.

   b. Gen Ed Courses

   In order to meet the standards described by our accrediting organization, the American Speech Language Hearing Association, our students must have classes in the following areas to meet their requirements: at least 2 social sciences (PSY 100 and one other of a student’s choice) physical science (Physics 105 with lab), Biology (BIO 122), statistics (STS 232).

   c. Other courses that meet major requirements
2. What is the recommended first-year curriculum?
   See chart above.

3. Why is this the required/recommended first-year curriculum?
   Students are required to take three classes first year, PHY 105, CSD 100, and CSD 103. CSD students are expected to complete their Gen Ed requirements in the first two years as the majority of the CSD required coursework is in the junior and senior years.

   CSD 100 provides students with basic information about being a student at the University of Maine, support services, clubs, and activities that support their study of CSD and basic information about careers in CSD. It also encourages the development of a cohort of students majoring in CSD who will have classes together throughout their time at the University of Maine. CSD 130 allows students to dive a little deeper into the major in their second semester and provides an in depth look at a wide variety of communication disorders including basic descriptions etiologies, Diagnostic criteria, and treatment options.

   a. What are the expected student-learning outcomes?
      Students are expected to meet minimum grades required to move into advance courses, and for preparing them to meet accreditation learning outcome requirements by graduation. CSD must also achieve a grade of C- or better in their General Education classes and CSD 100 and CSD 130.

   b. How successful is this curriculum at producing expected outcomes
      Our curriculum is successful in meeting the expected outcome. Our student retention is very high (88%), and our students consistently achieve very high passage rates (above average) on the national speech-language exams.

4. What are the risks associated with this curriculum?
   Students have indicated that they would like more CSD content earlier. Our students are generally successful with this curriculum as shown with the relatively low DFWL rates.

5. In light of risk assessment, what are the alternative first-year curricula?
   Given the requirements of accreditation, there are no alternatives to the first-year curriculum. Moreover, given our success rates indicated above, we feel that our curriculum is on target.
6. What practices, resources, and/or tactics are in place to mitigate risks?

Through our two CSD courses, in fall and spring semester respectively, we have close contact with our first year students which allows us to monitor for any issues, academic or otherwise, that may be detrimental to first-year student success. We help to transition students to university life by encouraging good study habits and introducing them to important campus resources for student success such as the career center, tutoring program, counseling center, etc.

The CSD 100 Instructor is also first-year advisor, which allows close contact with students during their first year and assists with course selection. The first year curriculum is fairly flexible. With only three required courses, and many Gen Ed courses, students take the more challenging upper level course in their third and fourth years. If students struggle with any of the high DFW courses in their first year (e.g. math, psychology, and physics), we can encourage them to take these classes during the summer or in their second year.

Through CSD 100 and CSD 103 we introduce first-year students to faculty, research faculty, alumni, upper-level students, and professionals in the field to begin to bridge the gap between their foundation level curriculum and their career goals.

While some courses with high DFWL rates across the university make up the first year curriculum, these courses are distributed in a manageable course load throughout the year, which minimizes risk for our students.

In CSD 100 students are introduced to two voluntary groups that could provide peer support: the Student Academy of Audiology and the National Student Speech Language Hearing Association. Research opportunities are available for Maine Top Scholars in their first year.

7. What additional steps can be taken to mitigate risk?

While we feel there are few additional steps needed for the overall success of students in their first year courses, our faculty are aware that first year success is a priority for the college and UMaine. Through our introductory classes and faculty-student advising sessions, we will closely monitor our students and try to identify problems as early in each semester as possible so that we can suggest interventions that will help them readjust course as needed.
Executive Summary

1. Key Findings
Our review of the ERS first-year curriculum is that it requires no changes, as the changes we have made in the past produced a sequence of courses that prepare our students for the remainder of their undergraduate career, while keeping the course load at a level that allows them to adjust to the academic and social/emotional challenges of their first year at UMaine. It also allows a student who has a poor first semester due to trouble adjusting to university life, to make up key courses in the summer, and still be able to graduate in four years.

This is accomplished by limiting STEM courses to those in their major and one mathematics course per semester during their first year. The mathematics courses are either MAT 122 and 126, or MAT 126 and 127. Of these three courses, MAT 127 is the most challenging for our students.

Chemistry and physics are not part of the first-year sequence.

2. Key Components of Plan to Improve Student Success and Timeline for Implementation
MAT 126/127 Sequence: Students in our BS programs are required to complete 2 semesters of Calculus. However, the challenges our first-year students face with regard to MAT 126 and 127 are largely outside action by our unit. Changes that would increase student success in these courses include:

- An “applied” two semester calculus sequence (the proposed MAT 116/117 sequence). Currently, a MAT 116 course is available, but the second semester MAT 117 course is not regularly taught. While some students who have completed MAT 116 are allowed to register for MAT 127, they are at a distinct disadvantage. This also means that students who transfer into our school with MAT 116 either take MAT 127 without the preparation of MAT 126, or they take MAT 126 at additional expense requiring unplanned time.

- More academic support or instructional changes for these students may be beneficial. When scheduling first year classes, we avoid 8 am classes whenever available.

- We cannot change the preparedness of the students who come to us. We can however, attempt to help them adjust to the academic expectations of university life. This will be accomplished by expanding our NFA 117 program in fall of 2019 to include more class time on study skills, attention and time management, and academic organization. We will also spend more time describing our degree options to help students find an academically appropriate program for each student.

- We are contemplating developing a one credit, seminar course for our 2nd-year students to continue contact with our undergraduate majors as they move through the program. The sophomore year is when our students begin to encounter more challenging courses. If students are going to leave our program, this is the more likely time that they will do so. By creating a way to stay in contact with these students, we hope to increase retention at upper levels.
1. Required First-Year Curriculum
   a. Courses in the discipline

   ERS 101 (Introduction to Geology) is the fundamental course in the Earth Sciences discipline, and combines lecture with laboratory exercises. It is a pre-requisite for many upper level Earth and Climate Sciences courses.

   - ERS 121 (Humans and Global Change) satisfies a requirement within the BS Earth Sciences, Earth Sciences Concentration.
   - ERS 201 (Humans and Global Change) is our 1st year students’ first experience with applying earth and climate science concepts to real world examples. This includes collecting data during field trips for analysis, interpretation, and presentation.

   b. General Education Courses

   - ERS 101 (Introduction to Geology) satisfies a Gen Ed requirement for Applications of Scientific Knowledge and Laboratory in the Basic and Applied Sciences.
   - ERS 121 (Humans and Global Change) satisfies the Population and the Environment requirement within the Gen Ed Human Values and Social Contexts requirements.
   - ERS 201 (Humans and Global Change) satisfies a Gen Ed requirement for Applications of Scientific Knowledge and Laboratory in the Basic and Applied Sciences, as well as the Population and the Environment requirement within the Gen Ed Human Values and Social Contexts requirements.
   - MAT 122 (Pre-Calculus) or 126 (Calculus) satisfies part of the Quantitative Literacy requirement.
   - ENG 101 (College Composition) satisfies the Gen Ed Writing Competency Requirement.

   c. Other courses that meet major requirements

   NFA 117 (Issues and Opportunities) is required by the college. In the School of Earth and Climate Sciences, we use the course to introduce students to university facilities (Library, Career Center), our faculty and research program (through laboratory or field visits), and
university level academics. Additionally, all students participate in an overnight field trip to provide a first field experience and build cohort relationships. College-organized presentations address issues of drug and alcohol awareness, sexual harassment, and financial matters.

2. **What is the recommended first-year curriculum?**

Our recommended first-year curriculum is composed of a foundation course in Earth and Climate Sciences, ERS 101, followed by ERS 201. Students also take ERS 121 in their first semester. Additionally, students complete the beginning two semesters of their mathematics sequence, as indicated by their score on the Math Placement test. The first course is usually MAT 122 in the first semester, followed by MAT 126 in the second semester. Occasionally, students need to begin at MAT 111 (Algebra for College Mathematics). Some students move directly into MAT 126 Calculus. First semester students participate in the college-required NFA 117 (Issues and Opportunities). If room is available in ENG 101 (College Composition), students complete this in their first semester. If not, it is completed in the 2nd semester. The rest of the available credits are used to complete Gen Ed requirements.

3. **Why is this the required/recommended first-year curriculum?**

The rationale behind this organization is to expose students to basic concepts and vocabulary in Earth and climate sciences (ERS 101) and the linkage between humans and the climate system (ERS 121) in the first semester. ERS 201 allows students to experience the scientific method and apply concepts learned in ERS 101 to the natural world. We feel that it is important for students to begin their mathematics sequence early in their college career so that they have the basic skills in the field to be successful in chemistry, physics, and upper level Earth and climate science courses. Writing is an important communication skill in our discipline. As a result, we feel that mastering composition skills early in their career will be an advantage in later courses. NFA 117 is required, and also serves as a venue for cohort building.

a. **What are the expected student-learning outcomes?**

- **ERS 101** – Students will be familiar with the fundamental vocabulary and concepts underpinning the study of the Earth and climate sciences.
- **ERS 121** – Students will develop an understanding of the interrelationship of humans and climate, and be exposed to the chronology of our understanding of the earth/climate system.
- **ERS 201** – Students become familiar with the process of science through exploration of the global carbon cycle through lab and field studies. Students also begin to develop skills in working as a group and making both oral and written presentations of data interpretation.
- **NFA 117** – Students learn about some of the facilities available on campus through site visits (Library and Career Center), large group presentations (drug and alcohol awareness, sexual harassment, and financial literacy). At the unit level, they meet faculty and see research programs through lab and field visits.
- **MAT 111, 122, 126** – Students develop skills with the mathematical tools they will need in later required courses, such as upper level calculus, chemistry, physics, and
upper level Earth and climate science courses.

- ENG 101 – Students will develop compositional skills, including development of a theme, paragraph construction, and correct use of grammar.

b. **How successful is this curriculum at producing expected outcomes**

This curriculum has been generally successful in helping our students to create an academic foundation for their undergraduate career, and also have time to adjust to university life. Our first year majors in ERS 101 generally achieve “A’s” or ‘B’s” in the course. Although this is a large lecture course, students receive a small class experience (22 students) and individualized attention from graduate TA’s in the lab portion of the class. 1st year students are also successful in ERS 121, a smaller (50 person) class.

ERS 201 provides a challenge for some of our first year students in that they are asked to accomplish tasks that involve data interpretation where answers must come from their efforts, not from a textbook.

We have noticed a greater cohesion in our 1st year cohort since instituting the overnight field trip component in NFA 117 five years ago, after a donation of private funds made it possible. Additionally, we see motivated students use the connections with faculty developed during the course to explore research opportunities. Most 1st year SECS students achieve “A’s” or ‘B’s” in ENG 101. However, several have expressed frustration with the portfolio style of grading that does not provide feedback or benchmarks for success as the course progresses. Our students who do poorly in ENG 101 are those who have difficulty organizing their time and do not hand in the required number of submissions by the end of the semester.

Mathematics courses are the most challenging for our first year students. Past experience has shown that students who have received AP credit for Calculus I often receive low grades in MAT 122 or withdraw from the course before the end of the semester. As a result, we recommend that students with AP Calculus I credit take MAT 126 (Calculus I) to be sure they have the background for the upper level course and become acquainted to the style of teaching that is very different than what they experienced in high school as “elite” mathematics students.

4. **What are the risks associated with this curriculum?**

The greatest academic risk with this curriculum is the mathematics component, particularly MAT 126 and 127. In five years, we have had seven students leave the University of Maine after their first year in our program. 51% of these students received grades of D or F in MAT 122 or 126. This is not to say that the remaining students flourish in MAT 126 and 127. Within the past five years 32% of our students who took MAT 126 (68) either withdrew or repeated the course at UMaine to get the C- our program requires. Within the same time frame, 13% of the students who took the course (51) were repeating the course to replace a grade below a C-, and 22% withdrew before completing the course. Some of our students now elect to take MAT 127 (Calculus II) at other locations, often during summer break.
5. **In light of risk assessment, what are the alternative first-year curricula?**

We would not advocate a change to our first-year curriculum. The plan we use is the result of a self-assessment made over 5 years ago that removed Chemistry or Physics courses from our first-year student schedule. While no studies of retention were made at that time, first-year GPA’s were higher and student morale was much higher. If a student has a poor first semester due to trouble adjusting to university life, they can make up key courses in the summer, and still be able to graduate in four years.

While MAT 122 or 126 presents a challenge to many of our first year students, putting off the course until students are better adjusted to university life and study requirements puts their ability to graduate in four years at risk.

The risks to first year retention for many of our first-year students are not in the courses that they take, it is in their academic and social/emotional preparation for university life and academics. Many struggle with the balance between personal freedom and study skills. They do not believe that they need to go to class regularly, participate and be engaged in class, or that they need to review class notes and do background reading. They consistently under budget time for homework completion. Many (not just first-year) students are unwilling to seek help when they do not understand a concept or perform poorly in class. Some are shy, some are afraid of showing vulnerability, and others will say “I just can’t ask for help”. A common thread we see in our struggling students is a real lack of engagement in classes. The obvious sign of this is cutting classes, but there are others. These students often don’t remember their professor’s or TA’s names, know how they are being graded in the course, when assignments are due or exams given, or even what grades they have received.

6. **What practices, resources, and/or tactics are in place to mitigate risks?**

As stated above, we have already made a change in our first-year curriculum to address the risk of academic failure and withdrawal/suspension from the University after the first year. First-year students meet weekly with the undergraduate coordinator in NFA 117, where periodic check ins of grades are conducted. Students falling behind in their coursework are counseled on study habits/techniques, and are referred to the Tutor Center, the Math Den, Writing Center, and encouraged to take advantage of professor’s office hours.

The MAT 116 course may provide a more approachable route to Calculus for our BA majors, but for the majority of our students, who are BS students, this course is not an option. Our BS program requires two semesters of calculus, and the MAT 117 course has not been offered with assurances of a long-term presence that will allow our students to register for the MAT 116/117 sequence. If students take MAT 116, and MAT 117 is not offered, they enter MAT 127 at a disadvantage in terms of preparation.

Our NFA 117 class spends one class period on study skills and time management at the beginning of the semester, but at that point most students don’t seem to be interested. Everything is bright, shiny, and new and they have not yet encountered problems.
7. **What additional steps can be taken to mitigate risk?**

At a unit level, we plan to put more emphasis on study skills, attention and time management, reading syllabi, and keeping track of grades. Some of this effort will be continued at the beginning of the class, but I will also integrate some of this material throughout the semester.

Realizing that some students will have difficulties with mathematics, we will keep track of first-year math progress, and recommend our less challenging options (BA Earth Sciences, Earth Sciences Concentration in Ecology and Environmental Sciences) to those who appear to be struggling. A low grade in MAT 122 or 126 is often an indicator of trouble to come in chemistry and physics.

The things we see as necessary for first-year student success are not necessarily tied to the specific courses that they are taking as part of a program at UMaine.

- Many arrive without the skills required to complete university level work, and are “playing catch up” in their first year. These include English grammar and composition, algebra skills, and basic physical science (generally non-majors).
- Many first-year students have poor study skills and unrealistic expectations of the amount of personal effort required to succeed academically. Study time is largely focused on exams and is focused on memorization, rather than understanding. Time to complete reading and assignments is severely under budgeted. The idea of 45 hours of student involvement per credit hour is often regarded with great skepticism by students.
- Some students have difficulties adjusting to the large class sizes of lectures. They have primarily been in classes of 25-30 students, or less, with students and peers they know. Lectures with 200+ people and a distant professor in front are very intimidating, and can offer a sense of anonymity, making it easier to skip class (“no one knows I’m missing”). They also will not ask clarifying questions in these settings. Students have told me this is a particular challenge in math classes. Some of our students are now electing to take calculus courses in the summer here and elsewhere, because class size is smaller and the learning environment is better.
- First year students sometimes seem very disconnected from the courses they are taking. They often don’t know the course title, the professor’s or TA’s names, how they are being graded, or what their grades are.
- 8 am classes at the 100-level are a “recipe for failure” for many students, particularly first-years. At a time when high schools recognize that adolescents operate poorly at 8 am, we schedule these students for 8 am classes at a time in their life when they are most likely to stay up late and have no adult input on bed or rising times. Our personal experience is that many students either miss class or are present in body only at 8 am. If we want to improve their chances of success, we need to adjust to the results of studies that indicate that an 8 am class time is a real, tangible issue for this age group.
Executive Summary

1. Key Findings

- EES first year retention is 76%, on par with the average of 77% among all NSFA programs. Our rates can be attributed to the following:
  - Prior to this initiative, the EES program has committed critical thought, energy, and creativity to retaining first-year students within our program. Over the past several years, the program has made four changes to the first-year curricula to minimize risk based on informal student feedback, and data collection. For example, EES 117 was created 6 years ago to provide more cohort building opportunities and apply general NFA 117 lessons in the classroom with real-world, discipline-specific applications such as career and graduate school panels.
  - The small faculty and staff team of EES, as well as the moderate number of students within the major, has enabled EES to notice changes were needed and implement them.
- Formal discussions spurred by this initiative have led to a few ideas for changes to improve the first-year curriculum, specifically collecting data on first-year students, a transformation of the first-year course EES 117, and moving math for some students who struggle with it (see below for details).
- We would like to see this process of cross-program curricula review continue, in the future – with first-year data supplied to the program each year and resources committed to enable data collection and assessment, so that we may continue to fine-tune our curriculum to enhance student success.
2. Key Components of Plan to Improve Student Success and Timeline for Implementation

- EES will pursue the following to improve student success:
  - Collect data on first-year students, specifically 1) feedback on each EES 117 class session to learn how much of the material was new to them and 2) EES 117 exit surveys to learn whether students used the information learned in their other classes that semester.
  - We are considering a shift of EES 117 into something immersive, and/or small group advising, following the model of the School of Forest Resources. We will consider and discuss a change to the EES 117 curriculum in AY 2019-2020 to incorporate outcomes of the Provost’s initiative and look toward implementation of any changes in AY 2020-2021.
  - Shifting MAT 111 to first semester for those students who place into Math 111 via the Math Placement Test (most EES first-year students place into MAT 122, 116, or 126). Rather than waiting until spring semester to take math, we think this approach will provide continuity on the subject while high school math is still fresh on their minds and boost student success in a course that is difficult for students across UMaine.
  - To continue the assessment spurred by this initiative and facilitate an adaptive management approach, we will add to our annual workflow a request for aggregated student performance data from the Office of Institutional Research and review these data annually.
Ecology and Environmental Sciences B.S. Program
Recommended First Year Curriculum

<table>
<thead>
<tr>
<th>1. Fall Semester</th>
<th>Cr.</th>
<th>2. Spring Semester</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EES 117  Intro to Ecology &amp; Env. Sci</td>
<td>2</td>
<td>EES 100  Human Population &amp; the Global Env.</td>
<td>3</td>
</tr>
<tr>
<td>BIO 100  Basic Biology</td>
<td>4</td>
<td>BIO 200 OR Concentration course</td>
<td>3-4</td>
</tr>
<tr>
<td>ENG 101  ENG 101</td>
<td>3</td>
<td>MAT 116, 122, OR 126 Intro to Calculus, Pre-Calculus, or Calculus</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Additional course options:
- ERS 101 or ERS 102 Intro to Geology or Environmental Geology 4 SFR 222 Environmental Communication Skills 3
- Gen Ed Artistic and Creative Expression 1-3 STS 232 Statistics 3
- CMJ 107 or CMJ 103 or SFR 222 Environmental Communication or Fundamentals of Public Speaking 3 XXX Concentration or minor course 3

TOTAL 15-17 TOTAL 16-17

Bold = high priority first year courses
Italic = not required for all EES majors, but requirement for some students (BIO 200), or UMaine General Education requirements.

1. Required/Recommended First-Year Curriculum

All courses depicted above meet requirements for the EES major, with the exception of the Artistic and Creative Expression Gen Ed course, which is taken as an elective outside of the major, and BIO 200 (explained in more detail below). This is our recommended first-year curriculum; however there is some variation and flexibility on course selection and timing, depending on student transfer credits, seat availability, and concentration. High priority courses are noted: EES 117, ENG 101, EES 100, BIO 100, and MAT 116, 122, or 126.

a. Courses in the discipline

EES 117 is a requirement for all first-year students. EES 100 is also a requirement, and is frequently taken in a student’s second semester; however this can be taken at any point during a student’s academic career.

b. Gen Ed Courses

ENG 101 fulfills the Gen Ed requirement for writing competency. SFR 222, CMJ 107, and CMJ 103 fulfills the Gen Ed for Social Context and Institutions; EES 100 fulfills the Gen Ed
requirement for Population and the Environment; BIO 100 fulfills the requirement for Laboratory in the Basic or Applied Sciences; MAT 116, 122, and 126 and STS 232 meet Gen Ed requirements for Quantitative Literacy. SFR 220 meets the GenEd requirement for Western Cultural Traditions.

c. Other courses that meet major requirements

BIO 200 is not explicitly required for the EES major, but has become a prerequisite for other courses that are required for some students in the EES major (depending on concentration), e.g. BIO 319 OR WLE 200 OR SMS 300. We have not figured out what to do with this implicit requirement, and will continue to discuss it internally.

2. What is the recommended first-year curriculum?

See above.

3. Why is this the required/recommended first-year curriculum?

The recommended first year curriculum builds strong foundation for upper level course work in the EES major and a student’s concentration in their second, third, and fourth years, while meet many Gen Ed requirements in the process. In addition to the reasons outlined in 3a and 3b, we try to balance math and biophysical science courses with social science and humanities courses in each semester of students’ first years.

a. What are the expected student-learning outcomes?

The table below maps the EES undergraduate program assessment goals (the skills we train our students to achieve with our curriculum) with the required (high priority, bold) and recommended (additional options taken by many students but not all, not bold) courses in our first-year curriculum. We have designed our curriculum to get students started on all of our ultimate program objectives in their first year in at least one high priority course, and many students continue to build on those skills in additional course options.
**EES ASSESSMENT GOAL** | **COURSES IN WHICH GOAL IS ADDRESSED**
--- | ---
Effectively apply basic principles of the natural and social sciences to current issues of natural resources and the environment; | **BIO 100, EES 100, ERS 101 OR 102**
Understand and appropriately use the vocabularies of the natural and social sciences relevant to issues of natural resources and the environment; | **BIO 100, EES 100, ERS 101 OR 102**
Write and speak clearly about technical issues related to their concentration of study in the EES program; | **ENG 101, CMJ 103 OR 107 OR SFR 222**
Work collaboratively with other professionals in the disciplines of the major to address significant policy issues in natural resources and the environment; | Begun on a small scale in **EES 117**, but most experience comes in second+ year (EES 217, EES 489)
Choose and apply appropriate quantitative tools necessary to analyze significant issues related to their concentration of study in the EES program; | **MAT 116 OR MAT 122 OR MAT 126, STS 232**
Evaluate sources of technical information for credibility and relevance for addressing significant issues related to their concentration of study in the EES program; | Begun on a small scale in **EES 117 and 100**, but most experience comes in second+ year (concentration classes, EES 489)
Identify significant ethical issues in natural resources and the environment and be able to address these issues in an informed and thoughtful manner | Begun on a small scale in **EES 100**, but most experience comes in second+ year (PHI 232, concentration classes)

1Bold = high priority courses in recommended first year curriculum

### b. How successful is this curriculum at producing expected outcomes

In general, we think our first-year curriculum achieves its goal of getting students started on the EES program objectives, while not overwhelming them. Few EES students retake courses in the first-year curriculum (e.g., very few of our students do not receive the C or better required in BIO 100 to progress to BIO 200, 1-3 EES students have failed EES 100 in spring 2017, 2018 out of approximately 45 EES first-year students in that class each year). Per OIR data, the required/recommended first-year course with the highest DFW rate among EES students is MAT 116, 122, OR 126 (table 2).

In addition, though we are always working to identify and address shortcomings in our students meeting the EES program objectives, we find that students are generally well prepared for their upper level courses in the EES program. Finally, we have heard from students that they find the combination of classes they take in their first-year to be more than the sum of the parts. They characterize the overlap among courses such as BIO 100, EES 100, and ERS 101 OR 102 to be synergistic, as well as help with their workloads.

### 4. What are the risks associated with this curriculum?

Our typical first-year students’ curriculum includes two 3-4 credit courses that have a reputation
for being tough. In fall, this typically includes BIO 100 and ERS 101 OR 102. In spring, this includes BIO 200 and MAT 111, 116, 122, or 126. EES first-year students perform better than the course-wide averages for 9 of 14 of the typical first-year courses (table 2). However, areas of improvement remain (courses in which EES students perform lower than the UMaine averages are in bold). In addition, we provide data for EES required courses that were recently modified to improve first-year retention (e.g., CHY 121), and these OIR data support our impression that students perform better by delaying these courses.

### Success rate (%>F)

<table>
<thead>
<tr>
<th>Course</th>
<th>Priority</th>
<th>UM (Sp18)</th>
<th>EES FY (2015-18)</th>
<th>EES SO (2015-18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 100</td>
<td>high priority, typical first-year curriculum</td>
<td>93%</td>
<td>97%</td>
<td>94%</td>
</tr>
<tr>
<td>BIO 200</td>
<td>high priority, typical first-year curriculum</td>
<td>98%</td>
<td>93%</td>
<td>100%</td>
</tr>
<tr>
<td>EES 100</td>
<td>high priority, typical first-year curriculum</td>
<td>92%</td>
<td>96%</td>
<td>90%</td>
</tr>
<tr>
<td>EES 117</td>
<td>high priority, typical first-year curriculum</td>
<td>not avail.*</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>ENG 101</td>
<td>high priority, typical first-year curriculum</td>
<td>97%</td>
<td>98%</td>
<td>100%</td>
</tr>
<tr>
<td>MAT 111</td>
<td>high priority, typical first-year curriculum</td>
<td>92%</td>
<td>88%</td>
<td>&lt;5 students</td>
</tr>
<tr>
<td>MAT 116</td>
<td>high priority, typical first-year curriculum</td>
<td>94%</td>
<td>&lt;5 students</td>
<td>&lt;5 students</td>
</tr>
<tr>
<td>MAT 122</td>
<td>high priority, typical first-year curriculum</td>
<td>88%</td>
<td>74%</td>
<td>86%</td>
</tr>
<tr>
<td>MAT 126</td>
<td>high priority, typical first-year curriculum</td>
<td>93%</td>
<td>93%</td>
<td>&lt;5 students</td>
</tr>
<tr>
<td>CMJ 103</td>
<td>additional options for first-year curriculum</td>
<td>98%</td>
<td>93%</td>
<td>100%</td>
</tr>
<tr>
<td>CMJ 107</td>
<td>additional options for first-year curriculum</td>
<td>not avail.*</td>
<td>97%</td>
<td>100%</td>
</tr>
<tr>
<td>SFR 222</td>
<td>additional options for first-year curriculum</td>
<td>97%</td>
<td>98%</td>
<td>90%</td>
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<td>ERS 101</td>
<td>additional options for first-year curriculum</td>
<td>98%</td>
<td>100%</td>
<td>100%</td>
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<tr>
<td>ERS 102</td>
<td>additional options for first-year curriculum</td>
<td>100%</td>
<td>97%</td>
<td>100%</td>
</tr>
<tr>
<td>STS 232</td>
<td>additional options for first-year curriculum</td>
<td>95%</td>
<td>100%</td>
<td>92%</td>
</tr>
<tr>
<td>ECO 180</td>
<td>additional options for first-year curriculum</td>
<td>not avail.*</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>SFR 220</td>
<td>additional options for first-year curriculum</td>
<td>not avail.*</td>
<td>100%</td>
<td>92%</td>
</tr>
<tr>
<td>EES 140</td>
<td>moved to second year</td>
<td>100%</td>
<td>96%</td>
<td>96%</td>
</tr>
<tr>
<td>EES 141</td>
<td>moved to second year</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>CHY 121</td>
<td>moved to second year</td>
<td>81%</td>
<td>90%</td>
<td>62%</td>
</tr>
<tr>
<td>CHY 123</td>
<td>moved to second year</td>
<td>86%</td>
<td>78%</td>
<td>75%</td>
</tr>
<tr>
<td>CHY 122</td>
<td>moved to second year</td>
<td>91%</td>
<td>71%</td>
<td>93%</td>
</tr>
<tr>
<td>CHY 124</td>
<td>moved to second year</td>
<td>97%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>PHY 111</td>
<td>added as alternative to CHY 122, 124</td>
<td>88%**</td>
<td>&lt;5 students</td>
<td>&lt;5 students</td>
</tr>
</tbody>
</table>

*not available in spring 2018 data

**fall 2017 data used because it was not offered in spring 2018

5. **In light of risk assessment, what are the alternative first-year curricula?**

We have made a number of changes in recent years to use alternatives to mitigate risk in our first-year curriculum. In the past three years we have changed our curriculum with increasing first-year student success in the following ways:

- Pushing back CHY 121/123 (21% DFW) and CHY 122/124 (27% DFW) sequence to second year or later, to have students avoid taking it before they have gotten accustomed to
Adding an alternative to CHY 122/124, specifically PHY 111 (22% DFW). PHY 111 has a slightly lower DFW rate than CHY 122/124, but more importantly, we hope that there are at least some students who struggle less in physics than chemistry such that an additional option is helpful for them.

- Pushing back EES 140/141 (34% DFW) until the second year or later, and strongly encouraging students to complete chemistry first though it is only a suggested prerequisite.

- Pushing back math until the second semester of the student’s first year to limit students to two 4 credit courses in their first semester and allow them to become accustomed to college level work. In addition, math requirements are determined by a student’s concentration, so delaying math until a student has gained clarity on the academic track they will pursue in EES ensures that the student takes the most appropriate math course and eliminates the possibility of extraneous math courses.

- Adding MAT 116, which has a lower DFW rate than the alternatives within our curriculum (MAT 122 and 126) as an option for students to fulfill their math requirement

Other options we are currently considering are:

- Keeping the math requirement in spring of the first year for students who pass into MAT 122 or 126, but perhaps shifting MAT 111 to fall for students who place into that lower course (all EES students must take MAT 116, 122, OR 126 for their major, but a few place into MAT 111) to enable students to get started on college level math while high school math is still fresh in their minds. We could replace ERS 101 OR 102 with MAT 111 to maintain just two 4 credit courses in fall for these students.

6. What practices, resources, and/or tactics are in place to mitigate risks?

- In recent years, we have worked to bolster opportunities for EES first-year students to form a support system through cohort-building classes (EES 117) with embedded group activities and active learning (EES 117, 100). EES 117 was created after the last curriculum review (circa 2012). Student exit surveys at the time indicated that students desired an NFA 117 course specifically geared toward EES-relevant topics and cohort-building. In the years since, we think this course has proven successful. Anecdotally, a professional from a land trust in Maine who had recently interviewed an EES first-year student commended the professional skills the student attributed to learning in EES 117, such as effective communication, professionalism, and a clear plan for extracurricular professional development.

- We have increased our offerings of extracurricular events, both social (showing at Emera astronomy center, back to school ice cream social) and oriented toward professional development (resume workshops, fall and summer job fairs).

- Peer mentoring with ambassadors in (EES 117) and outside of first-year classes.

- Working closely with other units in the UMaine signature area Forestry and the Environment (Wildlife, Fisheries, and Conservation Biology and the School of Forest Resources) to hold joint social and professional development events (e.g., fall and spring job fairs).

- Staged advising approach, where all students are advised by EES faculty who teach the first-year seminar (EES 117) until they have declared their concentrations, in the meantime receiving training about how to chart their academic path in class and in advising meetings.

- (Optional) training about advising for faculty and mandatory training about advising for
students (in EES 117, we spend several class sessions on advising, from choosing classes and understanding the concentration options to MaineStreet enrollment and how to prepare for an advising meeting with your advisor). Feedback from faculty has been very positive; several stated it was the most advising training they had ever been given.

7. **What additional steps can be taken to mitigate risk?**

- We are considering a few changes to our EES core courses based on student feedback and approaches that have been successful in other programs. Our students repeatedly call for an immersive first-year experience similar to the Tanglewood camp attended by first-year students in the School of Forest Resources. We would like to implement something similar, but are first focusing on reworking upper-level EES core classes. In addition, we want to be careful about increasing student costs through course fees, a necessary change if we shift to an immersive first-year experience. Another idea we are considering is transforming some part of our first-year success course (EES 117) into informal group advising sessions with faculty, also similar to the SFR model. We have heard positive feedback from both SFR faculty and students about this approach.
Executive Summary

1. **Key Findings**
   
   Our review of the undergraduate programs offered by the School of Economics (SOE) did not identify any major roadblocks to first-year retention. The two introductory courses (ECO 120 and 121) that our majors take in their first year have lower DFW rates than most of the other large-enrollment courses at UMaine. The small-class environment of ECO 117, which is another required course for our first-year majors, provides a supportive venue for student cohort building, as well as an opportunity for close contact with SOE faculty. A slight issue of concern is a bimodal distribution of math skills and preparedness of our majors. Although we recommend that students take a math course in their first year, it is not required for continuing in the major.

   According to information provided by the UMaine Office of Institutional Research (dated 4.30.18), the School of Economics has a 4-year average first-year retention rate of 83 percent.

2. **Key Components of Plan to Improve Student Success and Timeline for Implementation**

   With future hires in SOE, we might attempt a pilot project that would include a low-enrollment section of ECO 120 for our majors to be taught alongside ECO 117. This two-course sequence, offered in the fall semester, would cover the introduction to the School of Economics, UMaine, and the field of economics (focus of ECO 117) along with the principles of microeconomics (focus of ECO 120). A low-enrollment section of ECO 120 would allow for more direct contact with the instructor, stronger cohort building with other SOE majors, and a deeper coverage of the topics through in-class activities, group work and more written assignments. As part of the pilot, we could evaluate the impacts of this low-enrollment section on student learning and retention.
School of Economics B.S./B.A. Program
Recommended First Year Curriculum

1. Fall Semester | Cr. | 2. Spring Semester | Cr.
---|---|---|---
ECO 117 | Issues and Opportunities | 1 | ECO 121 | Principles of Macroeconomics (G) | 3
ENG 101 | College Composition (G) * | 3 | ECO | Elective | 3
ECO 120 | Principles of Microeconomics (G) | 3 | XXX | Gen Ed – Applied or Lab Science (G) | 3
STS 215, STS 232, STS 434 | Statistics (G) / or Gen Ed Elective | 3 | XXX | Gen Ed (G) | 3
XXX | Gen Ed Elective | 3 | MAT 122, 116, or 126 | Pre-Calculus or Calculus (G) | 3-4
TOTAL | 13 | TOTAL | 15-16

* G = General Education course

1. **Required/Recommended First-Year Curriculum**
   For new majors beginning an Economics major in their first semester at UMaine, a typical schedule consists of the following required and recommended courses:
   
   a. **Courses in the discipline**
      ECO 117, ECO 120, and ECO 121 are foundational economics courses taken by students in their first year.

   b. **Gen Ed Courses**
      We typically place first year students in several Gen Ed classes during the fall and spring semester (e.g., ANT 102, ENG 101, POS 100, PSY 100, a population and environment gen-ed, etc.) and have them fulfill these UMaine requirements as early in their academic career as possible. ECO 120 and ECO 121 fulfill the Gen Ed requirement in Social Contexts and Institutions. MAT 122/116/126 and STS 215/232/434 meet the Quantitative Analysis Gen Ed requirement. SOE has many students that are double majors and minors. For example, Political Science double majors take several POS courses.

   c. **Other courses that meet major requirements**
      Math and Statistics are required for the major and also satisfy Gen Ed requirements as described above.

2. **What is the recommended first-year curriculum?**
   See above.

3. **Why is this the required/recommended first-year curriculum?**
a. What are the expected student-learning outcomes?

The expected student-learning outcomes for the SOE first-year curriculum are a basic understanding of: (1) demand and supply, (2) market equilibrium, (3) market failure, (4) market structure, (5) appropriate use of policy and market interventions, (6) gains from trade, (7) macroeconomic indicators, (8) economic growth and productivity, (9) money supply and banking, (10) the factors affecting the performance of the overall economy, and (11) statistics.

b. How successful is this curriculum at producing expected outcomes?

Most of our majors enter the “second-year and above” classes with a sufficient understanding of the concepts listed above and, after a short review, are able to build from these concepts with more advanced material.

According to information provided by the UMaine Office of Institutional Research (dated 4.30.18), the School of Economics has a 4-year average first-year retention rate of 83 percent. This exceeds the campus-wide retention rate of 76 percent (UMaine Office of Institutional Research, dated 8.24.18).

4. What are the risks associated with this curriculum?

The recommended first-year courses (i.e., ECO 120 and 121) typically have large enrollments (e.g., 100 students or more) and, therefore, it’s sometimes difficult for students—both SOE majors and non-majors—to make a connection with the faculty instructors. Although ECO 120 and 121 are large enrollment courses, the DFW rates seem to be a little lower—21 percent and 18 percent, respectively (Spring 2018 DFWL report)—than most of the other large enrollment courses on campus. As for the first-year Gen Ed courses, we typically select the fall semester classes for the students, which minimizes haphazard selection of Gen Ed courses.

For some of our students, the challenges of succeeding in a math course might be a risk associated with our curriculum. Of our students that take MAT 126, the success rate is 91 percent—this is high compared to many other majors. Of our students that take MAT 122, the success rate is 60 percent. These numbers suggest a bimodal distribution of math skills and preparedness in our majors.

5. In light of risk assessment, what are the alternative first-year curricula?

As noted above, the main risk associated with our first-year curriculum is the large-enrollment courses first-year students need to take (e.g., ECO 120 and 121, Gen Ed courses such as PSY 100). At this point, we do not offer ECO 120 and 121 in sections smaller than, say, 75 to 100 students. Another potential risk for some students is taking a math and / or science course in the first year. An alternative for these students is to take the required math and science courses starting in the second year.
6. **What practices, resources, and/or tactics are in place to mitigate risks?**
   To balance the large sections of ECO 120 and 121, our first-year students take ECO 117 (Issues and Opportunities in Economics), which typically has fewer than 15 students. In a small class setting, our students have the opportunity to build a cohort of first-year Economics majors and they have closer contact with SOE faculty. Given the relatively small cohorts of our entering classes—our programs add substantial numbers of majors through internal transfers—we can assess strengths and weaknesses of our new students when setting their first-semester schedules.

7. **What additional steps can be taken to mitigate risk?**
   With future hires in SOE, we might attempt a pilot project that would include a small section of ECO 120 for our majors to be taught alongside ECO 117. This two-course sequence, offered in the fall semester, would cover the introduction to the School of Economics, UMaine, and the field of economics (focus of ECO 117) along with the principles of microeconomics (focus of ECO 120). A small section of ECO 120 would allow for more direct contact with the instructor, stronger cohort building with other SOE majors, and a deeper coverage of the topics through in-class activities, group work and more written assignments. As part of the pilot, we could evaluate the impacts of this smaller section on student learning and retention.
UMaine First-Year Retention Project
Animal and Veterinary Sciences (ANV)
Sue Sullivan, Program Coordinator
April, 2019

Executive Summary

1. Key Findings

Some poor performance in the first semester can be expected with any STEM-based curriculum. Based on the rate of poor performance (grade of D, F, or W) in AVS 145 and MAT 116 of 16-17% and that 22% of students earned less than a 2.0 in the first semester, it seems reasonable to expect that about 20% of our incoming first-year students will not achieve success in the curriculum. There do not appear to be clear indicators of which students are most likely to perform poorly.

The 45% rate of D,F,W grades in CHY 121, however, is higher than expected, based on student performance in other courses. More supports for students in CHY 121 and 123 are needed. If students do not need the CHY chemistry series for future career success, such as the students who do not want to go to vet school, the BMB chemistry series might improve performance.

Institutional data showed an average ANV first-year retention rate at the University between fall 2011 and fall 2016 of 69%. We expect that more recent data will show a higher retention rate, due to changes in the first-year math requirement and changes to AVS 145 Introduction to Animal Science.

2. Key Components of Plan to Improve Student Success and Timeline for Implementation

- Fall 2019- change the curriculum for those not planning to declare the Pre-Vet concentration to the BMB chemistry courses and move chemistry to second year.
- Spring 2019- move AVS 249 Laboratory and Companion Animals into spring of second year, so that students are better prepared for scientific writing tasks within the course.
- Summer 2019- offer an alternative first-year curriculum to students and families at orientation, which includes delaying the start of CHY 121, 123 until spring of first year.
- Fall 2019- Continue efforts to support students through NFA 117, AVS 145 and first-year advising.
- Fall 2019- distribute a handout to all students summarizing job opportunities in animal science not related to vet school.
BS Degree in Animal and Veterinary Sciences, First Year

1. What is the required first-year curriculum?

First-year curriculum (2018-2019) for Animal and Veterinary Sciences degree

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>FALL 1st year</td>
<td></td>
<td>SPRING 1st year</td>
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</tr>
<tr>
<td>AVS 145 Intro to Animal Science</td>
<td>3</td>
<td>AVS 249 Lab/Comp Animal Science</td>
<td>3</td>
</tr>
<tr>
<td>AVS 146 Intro to Animal Science Lab</td>
<td>1</td>
<td>BIO 200 Biology of Organisms</td>
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<tr>
<td>BIO 100 Basic Biology</td>
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<td>CHY 122 General Chemistry II</td>
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<td>CHY 121 General Chemistry I</td>
<td>3</td>
<td>CHY 124 General Chemistry II Lab</td>
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<tr>
<td>CHY 123 General Chemistry I Lab</td>
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<td>ENG 101 College Composition</td>
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<td>MAT 116 Intro to Calculus</td>
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<td>NFA 117 Issues and Opportunities</td>
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<td></td>
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First-year curriculum (2018-2019) for Pre-Veterinary Concentration

<table>
<thead>
<tr>
<th>FALL 1st year</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>AVS 145 Intro to Animal Science</td>
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<td>AVS 249 Lab/Comp Animal Science</td>
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<tr>
<td>AVS 146 Intro to Animal Science Lab</td>
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<td>BIO 200 Biology of Organisms</td>
</tr>
<tr>
<td>BIO 100 Basic Biology</td>
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<td>CHY 122 General Chemistry II</td>
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<td>CHY 121 General Chemistry I</td>
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<td>CHY 124 General Chemistry II Lab</td>
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<tr>
<td>CHY 123 General Chemistry I Lab</td>
<td>1</td>
<td>ENG 101 College Composition</td>
</tr>
<tr>
<td>MAT 116 Intro to Calculus</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td>4</td>
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<tr>
<td>MAT 126 Calculus I</td>
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</table>

2. What is the recommended first-year curriculum?

The first-year fall and spring curriculum in ANV is the same for students who plan to complete pre-veterinary requirements and those who do not. This is because at least 90% of incoming first-year students indicate a desire to be a veterinarian. The student’s realistic understanding of the difficulty of this path and the transition of many of those initial plans into different career paths occur gradually over the first year.

All of the first-year courses are required for the ANV degree and the Pre-Vet Concentration and there are no free electives in the first year. Students declare the Pre-Vet Concentration at the end of their first year.
A small subset of students (usually less than 5 students out of 80) do not place into MAT 116 Intro to Calculus and thus start with MAT 111 Algebra for College Mathematics and delay Chemistry until the second year. If those students choose the Pre-Vet Concentration, they will take five years to complete the program. Those students might take a Gen Ed class in each of the first two semesters and some other required courses, such as CMJ 103 Public Speaking.

Rarely (<5 students out of 80), an ANV first-year student will opt to take MAT 126 Calculus I instead of MAT 116. Generally this occurs when the student has a strong calculus background from high school. Two years ago, before changing to MAT 116 as the math requirement, veterinary colleges were queried to make sure they would accept MAT 116 as a prerequisite for admission.

3. Why is this the required/recommended first-year curriculum?

Veterinary colleges prefer that as many as possible of the prerequisite courses for admission be taken before senior year. Therefore students who wish to apply to vet school take two science prerequisite courses during most of their first six semesters.

Upon entry into the Animal and Veterinary Sciences program in fall of first year, the vast majority of students (at least 90%) have the goal of becoming a veterinarian. Therefore, all students are enrolled in the same set of classes that meet requirements for both the Animal Science degree and the Pre-Vet Concentration. That way, no students start out behind on completing Pre-Vet requirements within the four years.

a. What are expected student learning outcomes?

The primary goal of our BS degree in Animal and Veterinary Sciences is to prepare students for a career in an applied science profession. The basic science curriculum allows students to succeed in the applied science curriculum (upper-level AVS courses) during later years, and in vet school.

Goals for the first year in our Animal and Veterinary Sciences program are that students will be able to:
1. Achieve success in college by adopting good study habits and developing self-confidence.
2. Successfully complete the prerequisite courses for veterinary colleges that are in the first-year curriculum (BIO 100 and 200, CHY 121/123 and 122/124, MAT 116, ENG 101). All grades should be C- or better except for a C or better in ENG 101.
3. Build foundational knowledge and skills in preparation for AVS upper-level coursework.
4. Realistically assess their own strengths and interests and find a new career path if they decide against vet school.

b. How successful is this curriculum at producing expected outcomes?

Based on data that 47% of first-year students in ANV (fall 2018) obtained a GPA of 3.0 or higher in first semester of first year, it seems that nearly half of our incoming students can meet goals 1 and 2. We understand, however, that many of the students entering the program will not achieve the grades necessary to apply to vet school and will need to reframe their career plans.
Students often express concern that they not get behind on the required curriculum relative to other students. Placing them all in the same classes reassures students that they are on track for the Pre-Vet concentration.

Immersion into an introductory animal science course (AVS 145, 146), biology and chemistry, and the first year orientation course (NFA 117) helps students to learn about the field of animal science and the route to veterinary school. This grasp of reality helps many students to consider other career paths in animal science and other majors outside of ANV. Finding a more realistic goal for themselves sooner rather than later is considered to be a good outcome.

The spring semester course in the major, AVS 249 Laboratory and Companion Animal Science, includes exercises in scientific writing, including summarizing a research article. Given that most students in the course are first-year students who are concurrently enrolled in ENG 101 College Composition, performance on the writing assignments is below the expected level and requires substantial instructor feedback.

4. What are the risks associated with this curriculum?

Loss of confidence in their ability to attend college, wasting tuition dollars, grief over the loss of a long-held career goal, and anger are possible negative consequences for some first-year ANV students during the first year.

Rates of earning a D or F or withdrawing in fall 2018 for ANV majors were:

- BIO 100- 4%
- MAT 116- 17%
- CHY 121- 44%
- AVS 145- 16%

At least 10 students withdrew from CHY 121 mid-semester. Many students are re-taking CHY 121 in their second semester (spring 2019).

22% of first-year students in ANV earned a GPA less than 2.0 in their first semester. Math SAT’s in this low-GPA group ranged from 500 to 600. The rate of low GPA’s would have been higher if some students had not withdrawn from CHY 121.

Retention rates within the ANV program and within the University are impacted by this first-year curriculum. Using institutional data, the average retention rate of students returning to the ANV major after one year in the program was 51% (fall 2011 to fall 2016). The average retention rate of AVS first-year students still enrolled at UMaine after one year was 69% (fall 2011-fall 2016). The rates vary significantly from year to year. Most recently, data collected within our program showed that 60% of students admitted to ANV in fall 2017 returned to the ANV program in fall 2018. 85% of first-year ANV students from fall 2017 were retained at UMaine one year later. Both recent data points were higher than the average of six previous years.
5. In light of risk assessment, what are the alternative first-year curricula?

For the students entering UMaine who do not want to attend vet school and choose to complete only the base Animal and Veterinary Sciences degree, the BMB 207, 208, 209, 210 chemistries will be adequate preparation. Also, the BMB chemistry requirement can be moved to second year, to allow a more reasonable first-year curriculum and improvement of math skills before taking chemistry. AVS 249 Laboratory and Companion Animal Science will be moved into second year, since the course contains scientific writing assignments. The goal for moving AVS 249 is that another year of maturity and college experience will result in better writing skills. The AVS teaching faculty members have approved these changes for fall 2019. In the revised curriculum (below), the first-semester credits also decrease from 16 to 15.

**First-year curriculum (2019-2020) for Animal and Veterinary Sciences degree**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
<th>Courses</th>
<th>Credits</th>
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<tbody>
<tr>
<td><strong>FALL 1st year</strong></td>
<td></td>
<td><strong>SPRING 1st year</strong></td>
<td></td>
</tr>
<tr>
<td>AVS 145 Intro to Animal Science</td>
<td>3</td>
<td>BIO 200 Biology of Organisms</td>
<td>4</td>
</tr>
<tr>
<td>AVS 146 Intro to Animal Science Lab</td>
<td>1</td>
<td>CMJ 103 Public Speaking</td>
<td>3</td>
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<tr>
<td>BIO 100 Basic Biology</td>
<td>4</td>
<td>STS 232 Principles of Statistical Inf.</td>
<td>3</td>
</tr>
<tr>
<td>ENG 101 College Composition</td>
<td>3</td>
<td>General Education: Cultural Diversity</td>
<td>3</td>
</tr>
<tr>
<td>MAT 116 Intro to Calculus</td>
<td>3</td>
<td>Animal Science Elective</td>
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</tr>
<tr>
<td>NFA 117 Issues and Opportunities</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>15</strong></td>
<td></td>
<td><strong>16</strong></td>
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</tbody>
</table>

The first-semester curriculum for the Pre-Veterinary Concentration (most of the students entering the program) will not change for fall 2019, as published in the Undergraduate Catalog. However, we drafted an alternative plan on paper where students could start the chemistry series in spring of 2019 and still be on track to complete the Pre-Vet concentration in four years. Since 44% of our first-year students did not succeed in CHY 121 in fall 2018, many are retaking it in spring 2019 anyway. One downside to this alternative first-year curriculum is the eight months between completion of CHY 121 and the start of CHY 122, as CHY 122 is not offered in fall. Other courses will have to shift in the Pre-Vet curriculum, resulting in BMB 300/305 in the senior year. Identifying students for this delayed start to the CHY 121 chemistry in the Pre-Vet curriculum will be tricky, but perhaps students, in consultation with parents, might self-select the alternative curriculum.

**Alternative choice for the Pre-Vet concentration in First Year:**

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<tr>
<td>AVS 146 Intro to Animal Science Lab</td>
<td>1</td>
<td>CHY 121 General Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>BIO 100 Basic Biology</td>
<td>4</td>
<td>CHY 123 General Chemistry I Lab</td>
<td>1</td>
</tr>
</tbody>
</table>
6. What practices, resources, and/or tactics are in place to mitigate risks?

For the students entering the ANV program last fall 2018, the math requirement for both the degree and concentration was changed to MAT 116 Intro to Calculus from MAT 122 in ANV and from MAT 126 in the Pre-Vet concentration. Any potential positive impact of this change would be seen in one-year retention data for fall 2019 and beyond.

Starting in fall 2016, a new tenure-track faculty member took over teaching the AVS 145 and 146 Intro to Animal Science lecture and lab. The course content was revised and new labs were created. The student experience in the first-semester course in the major has markedly improved with the new instructor. A positive view of opportunities in the field of Animal Science and of the program in general helps students remain in the major. This influence of the new instructor may also impact future retention data. Discussion of career options in class and hands-on experiences in the field are components of AVS 145, 146.

All first-year students in ANV are enrolled in NFA 117 Issues and Opportunities. Much of the course content is geared toward promoting student success in the major and at UMaine. A representative from the Tutor Program talks with ANV students in NFA 117. Students also meet the AVS faculty members in NFA 117 and listen to speakers who are currently professionals in the field.

Specialized first-year advisors in Animal and Veterinary Sciences have expertise in assisting first-year students with issues and are readily available to answer questions.

Most of the incoming students attend summer orientation in June. The AVS Program Coordinator talks with students and parents about the rigor of the first-year curriculum and gives advice on success strategies. We will also talk with students about the option to start chemistry in the spring of first year at orientation.

Communication among students, faculty and staff in ANV occurs through the use of a Google Group that anyone can post to. Students can find out about opportunities to volunteer or events related to the field of animal and veterinary sciences. There are eight student organizations related to ANV, most of which have activities at Witter farm. Participation in clubs helps students connect with the major and their fellow students, hopefully promoting student success and retention.

7. What additional steps can be taken to mitigate risk?

We will encourage incoming students with low math SAT scores to prepare for fall semester math and science courses by participating in the summer preparedness tutorials offered by the college.
Instructors for AVS 145, 146 and NFA 117 can share information about student attendance and performance issues in their fall courses with each other and with the AVS Program Coordinator.

We will create a hand-out with job opportunities in Animal Science other than becoming a veterinarian, so that other options are clear to students who are struggling with the Pre-Vet curriculum.
Executive Summary

1. Key Findings

Last year there were thirteen students who entered the Food Science and Human Nutrition program as first year students. An equal amount transferred into the program from other majors or schools, but this report focuses only on first year retention. Our major has three concentrations that have three different recommended first year curriculum. The majority of our students choose the Human Nutrition Concentration, followed by Food Science, then Food Management. To transfer into the major there are varying GPA requirements for each concentration, but new students may not be aware of the need for academic strength when they enter as first year students. Student success in the Food Science and Human Nutrition concentrations is variable based in part on academic strength entering the program. The first-year curriculum is the most rigorous for the Food Science concentration, followed by Human Nutrition, with Food Management the least rigorous first year curriculum. Food Science and Human Nutrition require specific chemistry and biology sequences in order to access upper level courses within the major.

The primary courses where student success is an issue are chemistry and mathematics. We are also concerned that there is a negative retention effect from the large lecture class format.
2. **Key Components of Plan to Improve Student Success and Timeline for Implementation**

Our plan for improved student success includes a continued focus on student advising, students’ perceptions of connections to the program, and resources for success at the University. Continued faculty discussion of requirements of the first-year curriculum for the Food Science concentration is needed. This plan includes:

- Outreach to potential students on the expectations of the major and best practices for meeting these expectations. That could involve review of standardized testing scores to identify students who may need remedial work prior to some of the classes in the curriculum.
- Honest discussions of the rigor of the program, while providing continual connection to resources for success.
- Personal connections with students to engage them in being successful.
- Once a semester curriculum meetings with faculty to review student success and adapt our plan as needed, and discussion through the semester.
Food Science and Human Nutrition B.S. Program
Recommended First Year Curriculum

<table>
<thead>
<tr>
<th></th>
<th>1. Fall Semester</th>
<th>Cr.</th>
<th>2. Spring Semester</th>
<th>Cr.</th>
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<tr>
<td>FSN 101</td>
<td>Introduction to Food and Nutrition</td>
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<td>FSN 103</td>
<td>Science of Food preparation</td>
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<td>NFA 117</td>
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<td>Applied Mathematics for Business and Economics</td>
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<td>ENG 101</td>
<td>College Composition</td>
<td>3</td>
<td>COS 103</td>
<td>Introduction to Spreadsheets</td>
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<td>BIO 100</td>
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<td>4</td>
<td>CMJ 103</td>
<td>Public Speaking</td>
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<td>PSY 100</td>
<td>General Psychology</td>
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<td>Choice</td>
<td>Artistic and Creative Expression, or Western Cultural Tradition, or elective</td>
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<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>14</strong></td>
<td><strong>TOTAL</strong></td>
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</tr>
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</table>

1. **Required First-Year Curriculum**
   a. **Courses in the discipline**

   Courses in the discipline for first year students are:
   FSN 101
   FSN 103

   b. **Gen Ed Courses**

   BIO 100 meets future class requirements, and meets Gen Ed requirements for Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences

   PSY 100 meets Human Values and Social Context requirements, and is required for the major. MAT 115 meets quantitative literacy requirements, and provides foundation for future courses.

   c. **Other courses that meet major requirements**

   COS 103, CMJ 103

2. **What is the recommended first-year curriculum?**
   See table above.
3. Why is this the required/recommended first-year curriculum?
By the end of the first year, students need to have mastered foundation courses in nutrition, science and math. Classes are recommended either as a sequence to meet prerequisite in future courses, or recommended as they are 100 level courses that meet degree requirements, but can be taken at other times.

a. What are the expected student-learning outcomes?
The expected learning outcomes are either to meet the expected learning outcomes of a specific course, which has been determined by faculty as needed to competency within the degree and concentration, or, in addition to this, they are required to be mastered to go on for more advanced classes required for the major.

b. How successful is this curriculum at producing expected outcomes
Success rates are given for the recommended courses, using FSN specific data when available, and overall UMaine data when FSN data not available: FSN 101 (81%), ENG 101 (84%), BIO 100 (82%), PSY 100 (78%), FSN 103 (92%), MAT 115 (78%), COS 103 (84%), CMJ 103 (91%), and a Gen Ed elective. We note that some FSN students upgrade their math from MAT 115 and have the following success rate – MAT 122 (79%) and MAT 126 (67%). These success rates show that our students, like many others on campus, have the most difficulty with mathematics. In spite of some of our students struggling with mathematics, the vast majority are ultimately successful as the FSN four year average overall first-year retention rate is 87%.

4. What are the risks associated with this curriculum?
Mathematics is the largest course-specific challenge, particularly for our students who opt for MAT 126. A suspected challenge for our students is the impact of the large lecture class format for many of our students’ courses. This unfortunately includes our own FSN 101 course. Most students have not been exposed to this type of large lecture format, and lack of accountability for attendance increases the risk that students will get lost amongst the crowd. This is true even when it is a class within their major. If students want to switch to another major, or even another concentration within the FSN major, they may not have taken the classes they need to be on track. For example, if a student in the Food Management concentration wants to switch to the Human Nutrition concentration, they have missed the important second Biology course in the sequence.

5. In light of risk assessment, what are the alternative first-year curricula?
We believe that this is not an overly onerous curriculum, and supports are in place to help students with success in their first year. Changing class size is not available to us.

6. What practices, resources, and/or tactics are in place to mitigate risks?
NFA 117 is our department’s opportunity to have personal contact with first year students and assess their needs for resources and interventions for success. The instructor for NFA 117 is also the first-year advisor, so there is a real opportunity to get to know students. This is also a class where we work to build a sense of community amongst students in the major. The instructor of this course is also the first year-advisor, and requires all first-year students have check-in meetings monthly and during the advising period. Among the topics covered in NFA 117 are the student resources available on campus. For example, students are encouraged to take advantage of the Tutoring Program and Career Center.

7. **What additional steps can be taken to mitigate risk?**

We will work with students to find the appropriate math class. We will also do more to build a sense of community with our students, and try to mitigate the impact of the large classes. We may be able to bridge some of the NFA 117 time to discuss some of the FSN 101 topics to build student interest. We will explore having some seniors, graduate students or alumni attend the NFA 117 course to help build engagement and interest.
Food Science and Human Nutrition B.S. Program

Food Science Concentration
Recommended First Year Curriculum

<table>
<thead>
<tr>
<th>3. Fall Semester</th>
<th>Cr.</th>
<th>4. Spring Semester</th>
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<tbody>
<tr>
<td>FSN 101 Introduction to Food and Nutrition</td>
<td>3</td>
<td>FSN 103 Science of Food preparation</td>
<td>4</td>
</tr>
<tr>
<td>NFA 117 Issues and Opportunities</td>
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<td>CHY 122 General Chemistry II</td>
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<tr>
<td>MAT 126 Calculus</td>
<td>4</td>
<td>CHY 124 General Chemistry II Lab</td>
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<td>CHY 121 General Chemistry I</td>
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<td>CMJ 103 Public Speaking</td>
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<td>ENG 101 College Composition</td>
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<td>PSY 100 General Psychology</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>15</td>
<td>TOTAL</td>
<td>14</td>
</tr>
</tbody>
</table>

1. Required First-Year Curriculum
   a. Courses in the discipline
      Courses in the discipline for first year students are:
      FSN 101
      FSN 103
   b. Gen Ed Courses
      BIO 100
      MAT 125
      CHY 121/123
      CHY 122/124
   c. Other courses that meet major requirements
      COS 103, PSY 100

2. What is the recommended first-year curriculum?
   See table above.

3. Why is this the required/recommended first-year curriculum?
   By the end of the first year, students need to have mastered foundation courses in nutrition,
chemistry and math. Classes are recommended in a sequence to meet prerequisite in future courses, or recommended as they are 100 level courses that meet degree requirements, but can be taken at other times. BIO 100 meets future class requirements, and meets Gen Ed requirements for Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences. MAT 126 meets quantitative literacy requirements, and helps with success, and is a prerequisite for future courses.

There are five chemistry courses that are required towards the major. In order for students to advance to higher level courses in the major, they need the foundation courses put in this first year. For example, CHY 121 is a requirement for CHY 122. The pre-requisites for BMB 300, recommended to be taken fall semester of junior year are: “1 year of biology that includes BIO 100 & either BIO 200, BIO 208 or BMB 280, & 1 year of chemistry that includes BMB 207, 208, 209, & 210 or CHY 121, 122, 123, & 124. Minimum grade of C- is required in all courses”.

a. **What are the expected student-learning outcomes?**

The expected learning outcomes are either to meet the expected learning outcomes of a specific course, which has been determined by faculty as needed to competency within the degree and concentration, or, in addition to this, they are required to be mastered to go on for more advanced classes required for the major.

b. **How successful is this curriculum at producing expected outcomes**

Success rates are given for the recommended courses, using FSN specific data when available, and overall UMaine data when FSN data not available: FSN 101 (81%), ENG 101 (84%), PSY 100 (78%), FSN 103 (92%), COS 103 (84%), CMJ 103 (91%), MAT 126 (67%), CHY 121 (53%), and a Gen Ed elective. Of the courses that students in the Food Science concentration of the FSN major take, the largest DFWL percentages occur with mathematics and chemistry. In spite of some of the FSN students struggling with these courses, we feel this curriculum is appropriate given that this is a major with a science foundation. Our overall retention rate supports this given our recent four year rate of 87%.

4. **What are the risks associated with this curriculum?**

For this major, the required course with the lowest success rate is CHY 121. Mathematics is next, particularly for our students who opt for MAT 126. A suspected challenge for our students is the impact of the large lecture class format for many of our students’ courses. This unfortunately includes our own FSN 101 course. Most students have not been exposed to this type of large lecture format, and lack of accountability for attendance increases the risk that students will get lost amongst the crowd. This is true even when it is a class within their major. If students want to switch to another major, or even another concentration within the FSN major, they may not have taken the classes they need to be on track.
5. **In light of risk assessment, what are the alternative first-year curricula?**

(Is this where you add something about accreditation Unfortunately, there currently is no alternative first year curriculum due to the need to incorporate these classes early on in the sequence. Complicating this is the fact that CHY 122, a requirement in our sequence, is not offered in the fall semester. If CHY 122 were offered in the fall as well as the spring FSN could consider having students take this second semester of freshman year, after a semester of calculus. We will work with our Associate Dean’s office to try and better prepare our incoming students for chemistry.

6. **What practices, resources, and/or tactics are in place to mitigate risks?**

NFA 117 is our department’s opportunity to have personal contact with first year students and assess their needs for resources and interventions for success. The instructor for NFA 117 is also the first-year advisor, so there is a real opportunity to get to know students. This is also a class where we work to build a sense of community amongst students in the major. The instructor of this course is also the first-year advisor, and requires all first-year students have check-in meetings monthly and during the advising period. Among the topics covered in NFA 117 are the student resources available on campus. For example, students are encouraged to take advantage of the Tutoring Program and Career Center.

7. **What additional steps can be taken to mitigate risk?**

We will work with students to find the appropriate math class. We will also do more to build a sense of community with our students, and try to mitigate the impact of the large classes. We may be able to bridge some of the NFA 117 time to discuss some of the FSN 101 topics to build student interest. We will explore having some seniors, graduate students or alumni attend the NFA 117 courses to help build engagement and interest.
Food Science and Human Nutrition B.S. Program

Human Nutrition
Recommended First Year Curriculum

<table>
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<tr>
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<th>Cr.</th>
<th>Spring Semester</th>
<th>Cr.</th>
</tr>
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<tbody>
<tr>
<td>FSN 101 Introduction to Food and Nutrition</td>
<td>3</td>
<td>FSN 103 Science of Food preparation</td>
<td>4</td>
</tr>
<tr>
<td>NFA 117 Issues and Opportunities</td>
<td>1</td>
<td>BIO 208 Anatomy and Physiology</td>
<td>4</td>
</tr>
<tr>
<td>ENG 101 College Composition</td>
<td>3</td>
<td>Gen Ed. If needed – Student Choice</td>
<td>1</td>
</tr>
<tr>
<td>BIO 100 Basic Biology</td>
<td>4</td>
<td>CMJ 103 or ECO 120 Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>PSY 100 General Psychology</td>
<td>3</td>
<td>MAT 116 Pre-Calculus</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>14</td>
<td><strong>TOTAL</strong></td>
<td>14</td>
</tr>
</tbody>
</table>

1. Required First-Year Curriculum
   a. Courses in the discipline

   Courses in the discipline for first year students are:
   - FSN 101
   - FSN 103
   - NFA 117

   b. Gen Ed Courses

   BIO 100 meets future class requirements, and meets Gen Ed requirements for Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences
   BIO 208- Anatomy and Physiology – required for future nutrition classes

   MAT 116 meets quantitative literacy requirements, and provides foundation for future courses.

   c. Other courses that meet major requirements

   CMJ 103, ECO 120, FSN 270

2. What is the recommended first-year curriculum?
3. **Why is this the required/recommended first-year curriculum?**

(Accreditation mentioned here and/or in #5) By the end of the first year, students need to have mastered foundation courses in nutrition, biology and math. Classes are recommended either as a sequence to meet prerequisite for future courses, or recommended as they are 100 level courses that meet degree requirements, but can be taken at any time. Classes are either placed in sequence to meet prerequisites in future courses, or recommended as they are 100 level courses that meet degree requirements, but can be taken at other times.

Bio 100 and BIO 208 are required for other courses in the major. There is a four-course chemistry sequence that starts sophomore year.

In order for students to advance to higher level courses in the major, they need the foundation courses put in this first year.

a. **What are the expected student-learning outcomes?**

Expected learning outcomes include preparation for higher level classes within the major, and fulfillment of requirements for the major, or University requirements. (mention accreditation?)

b. **How successful is this curriculum at producing expected outcomes**

Of the recommended first-year courses there are no courses with success rates below 75%. Success rates are given for the recommended courses, using FSN specific data when available, and overall UMaine data when FSN data not available: FSN 101 (81%), ENG 101 (84%), BIO 100 (82%), PSY 100 (78%), FSN 103 (92%), CMJ 103 (91%), and a Gen Ed elective. Thus we see that of the courses the FSN students take, the largest DFWL percentages occur with mathematics. In spite of some of the FSN students struggling with mathematics, we feel this curriculum is appropriate and there are no undue risks. Our overall retention rate supports this given our recent four year rate of 87%.

4. **What are the risks associated with this curriculum?**

Mathematics is the largest course specific challenge, particularly for our students who opt for MAT 126. A suspected challenge for our students is the impact of the large lecture class format for many of our students’ courses. This unfortunately includes our own FSN 101 course. Most first-year students have not been exposed to this type of large lecture format, and lack of accountability for attendance increases the risk that students will get lost amongst the crowd. This is true even when it is a class within their major. If students want to switch to another major, or even another concentration within the FSN major, they may not have taken the classes they need to be on track.
5. **In light of risk assessment, what are the alternative first-year curricula?**

   We do not foresee the need for an alternative curriculum, but do see the need for continued attention to student support for success.

6. **What practices, resources, and/or tactics are in place to mitigate risks?**

   NFA 117 is our department’s opportunity to have personal contact with first year students and assess their needs for resources and interventions for success. The instructor for NFA 117 is also the first-year advisor, so there is a real opportunity to get to know students. This is also a class where we work to build a sense of community amongst students in the major. The instructor of this course is also the first-year advisor, and requires all first-year students have check-in meetings monthly and during the advising period. Among the topics covered in NFA 117 are the student resources available on campus. For example, students are encouraged to take advantage of the Tutoring Program and Career Center.

7. **What additional steps can be taken to mitigate risk?**

   We will work with students to find the appropriate math class. We will also do more to build a sense of community with our students, and try to mitigate the impact of the large classes. We may be able to bridge some of the NFA 117 time to discuss some of the FSN 101 topics to build student interest. We will explore having some seniors, graduate students or alumni attend the NFA 117 courses to help build engagement and interest.
Executive Summary

1. Key Findings

The ENH and SAG majors take courses that have moderate to high DFWL rates, including mathematics, PSY 100, and ECO 120. Recent transitions in program supporting faculty may have played a role in low retention. Particularly for the ENH program, there may not be enough disciplinary relevance in the current first year course requirements to provide the students a good notion of likely careers.

2. Key Components of Plan to Improve Student Success and Timeline for Implementation

The Associate Dean’s office will help us assess academic readiness of our students for higher risk courses and develop alternative pathways for these students. A search has been approved for a core faculty position to help support this program. We anticipate the successful candidate will bring a new perspective and approach to the curriculum, including PSE 101 and two other upper level courses.

For the fall 2019 incoming majors, the orientation course (NFA 117) will include expanded information on career opportunities, panel discussions with juniors and seniors in the majors, and visits from alumni.
Environmental Horticulture (ENH) B.S. Program
Recommended First Year Curriculum

<table>
<thead>
<tr>
<th>1. Fall Semester</th>
<th>Cr.</th>
<th>2. Spring Semester</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFA 117 Issues and Opportunities</td>
<td>1</td>
<td>MAT 115 or MAT 116 Applied Math or Intro to Calculus (G)</td>
<td>3</td>
</tr>
<tr>
<td>PSE 100 Plant Science (G)</td>
<td>4</td>
<td>Options depending on concentration:</td>
<td></td>
</tr>
<tr>
<td>ENG 101 College Composition (G)</td>
<td>3</td>
<td>ECO 254 Small Business Economics and Mgt.</td>
<td>3</td>
</tr>
<tr>
<td>BIO 100 or CMJ 102/103/SFR 222 Basic Biology or (G) Communication</td>
<td>3-4</td>
<td>CMJ 102/103 or SFR 222 Communication (G)</td>
<td>3</td>
</tr>
<tr>
<td>ECO 120 Principles of Microeconomics (G)</td>
<td>3</td>
<td>PSY 100 Intro to Psychology (G)</td>
<td>3</td>
</tr>
<tr>
<td>ART 100 Drawing 1 (G)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gen Ed or Elective Cultural Diversity, Western Cultural Trad., or Business (G)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gen Ed or Elective Cultural Diversity, Western Cultural Trad., or Business (G)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECO 121 Principles of Macroeconomics (G)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL 14-15 TOTAL 15
# Sustainable Agriculture (SAG) B.S. Program

## Recommended First Year Curriculum

<table>
<thead>
<tr>
<th>1. Fall Semester</th>
<th>Cr.</th>
<th>2. Spring Semester</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVS 145</td>
<td>3</td>
<td>PSE 101</td>
<td>4</td>
</tr>
<tr>
<td>Intro to Animal Science (G)</td>
<td></td>
<td>Cropping Systems (G)</td>
<td></td>
</tr>
<tr>
<td>BIO 100</td>
<td>4</td>
<td>ENG 101</td>
<td>3</td>
</tr>
<tr>
<td>Basic Biology (G)</td>
<td></td>
<td>College Composition (G)</td>
<td></td>
</tr>
<tr>
<td>NFA 117</td>
<td>1</td>
<td>FSN 101</td>
<td>3</td>
</tr>
<tr>
<td>Issues and Opportunities</td>
<td></td>
<td>Intro to Food and Nutrition (G)</td>
<td></td>
</tr>
<tr>
<td>PSE 100</td>
<td>3</td>
<td>MAT 116 or MAT 122</td>
<td>4</td>
</tr>
<tr>
<td>Plant Science (G)</td>
<td></td>
<td>Intro to Calculus or Pre-Calculus (G)</td>
<td></td>
</tr>
<tr>
<td>PSE 105</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable Agriculture (G)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>15</td>
<td>TOTAL</td>
<td>13-14</td>
</tr>
</tbody>
</table>

G= Gen Ed

1. **Required/Recommended First-Year Curriculum**

   a. **Courses in the discipline**

      Students in both degree programs take PSE 100: Plant Science. Sustainable Agriculture students take PSE 105: Principles of Sustainable Agriculture and PSE 101: Cropping Systems.

   b. **Gen Ed Courses**

      UMaine Gen Ed requirements are met by many of the required courses in the Environmental Horticulture and Sustainable Agriculture programs noted as (G) above. ENH students may also take Gen Eds or electives.

   c. **Other courses that meet major requirements**

      NFA 117: Issues and Opportunities. This course serves to help build a cohort of first year ENH and SAG students, and introduces students to helpful campus resources (e.g. the Tutor program). Class topics include a review of the SAG and ENH curriculum, development of good study habits, and an introduction to MaineStreet. Students also tour PSE campus facilities, meet PSE faculty, meet ENH and SAG alumni and attend upper-class student presentations on their PSE 396 Field Experience projects.

2. **What is the recommended first-year curriculum?**

   All recommendations are described in the tables above.
3. **Why is this the required/recommended first-year curriculum?**

The PSE 100 Plant Science course is the foundational discipline course and serves as a prerequisite for all upper level PSE courses.

The ENH Horticultural Business concentration recommends students take ECO 120, ECO 121 and PSY 100 towards the BUA minor. The ENH Landscape Design concentration recommends ART 100 and PSY 100, preparing students for an artistic career working with the public. The ENH Sustainable Horticulture and Turfgrass Management concentration recommends BIO 100 to prepare students for a science-intensive curriculum. All concentrations recommend NFA 117, ENG 101, math, communication and various Gen Eds to build foundational knowledge and skills and meet UMaine graduate requirements.

The SAG curriculum recommends that students take PSE 100, PSE 101 and PSE 105 as foundation courses. These courses are prerequisites for different upper level PSE courses and will help students understand what the major is about. Other recommended courses include NFA 117, AVS 145, FSN 101, BIO 100, ENG 101 and math. The collection of the PSE courses along with AVS 145 and BIO 100 prepare students for a science-intensive curriculum.

4. **What are the expected student-learning outcomes?**

Goals for the first year student in ENH and SAG include:

1. To earn a grade of C- or better in required PSE courses (ENH: PSE 100, SAG: PSE 101 and 105) to prepare students for upper level PSE courses that build upon foundational knowledge and skills in the introductory courses such as identifying parts of plants, identifying economically important plants and solving problems related to the production and management of plants.

2. By the end of the student’s first year, the foundational courses will have helped the students know if the major is the right major for themselves.

3. For first year students to gain a comfortable level of familiarity with PSE faculty, juniors and seniors in the program, and program alumni, to reinforce their choice of major as well as learn about career opportunities.

4. Successfully complete other 100 level math and science courses (BIO 100, MAT 115/116/122, AVS 145, FSN 101) that satisfy curriculum requirements, serve as Gen Eds and/or prerequisites for upper level courses within the individual curriculums.
b. How successful is this curriculum at producing expected outcomes

Due to the relatively low number of majors, the success data for the curriculum rely on campus wide OIR data for F17 or S18 depending which semester the course is normally taken. Rates of earning a D+ or better in first year curriculum courses are shown below:

<table>
<thead>
<tr>
<th>Both SAG and ENG</th>
<th>SAG</th>
<th>ENH</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSE 100: 82%</td>
<td>AVS 145: 83%</td>
<td>PSE 105: 83%</td>
</tr>
<tr>
<td>BIO 100: 83%</td>
<td>FSN 101: 81%</td>
<td>ECO 120: 67%</td>
</tr>
<tr>
<td>ENG 101: 84-87%</td>
<td>MAT 122: 61%</td>
<td>ECO 121: 100%</td>
</tr>
<tr>
<td></td>
<td>or MAT 116: 71%</td>
<td>MAT 115: 78%</td>
</tr>
<tr>
<td></td>
<td>PSY 100: 74%</td>
<td>or MAT 116: 71%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ECO 254: 86%</td>
</tr>
</tbody>
</table>

4. What are the risks associated with this curriculum?

The ENH and SAG majors must take courses that have moderate to high DFWL rates, including mathematics (MAT 115, 122 or 116), PSY 100, and ECO 120. Another issue to consider it that the ENH majors only take one course in their first year that directly relates to their major (PSE 100). These students may not feel engaged sufficiently in their discipline.

5. In light of risk assessment, what are the alternative first-year curricula?

If students weak in mathematics can be identified, we can arrange their schedule to delay the taking of mathematics. We will work with the college Associate Dean’s office to assess academic readiness of our students for the higher risk courses and develop alternative pathways.

6. What practices, resources, and/or tactics are in place to mitigate risks?

The ENH/SAG first year program coordinator advises all incoming ENH and SAG students for their first semester, before placing them with a PSE faculty advisor that aligns with the students’ interests. The program coordinator meets face to face with each first year student within the first three weeks of the semester.

While we discuss math and science academic readiness with incoming students, we will work with the Associate Dean’s office to better assess student readiness, and help students prepare for the fall or alter their fall course schedules if warranted.

7. What additional steps can be taken to mitigate risk?
The SAG/ENH faculty team has been in transition and search for a new key faculty member is scheduled. This new faculty hire along with the recently hired SAG/ENH Program Coordinator, we will be able to develop a plan to address the challenges our students face.

We will partner with our Associate Dean’s office to help assess our students’ readiness for math and science, and align incoming students with the correct schedule. We will dedicate some of our first year orientation fall course to hear from our students on what challenges they are facing in specific courses. We will also engage students early in the semester to identify students in trouble to seek help at the various tutoring options.

To help students feel more connected to their discipline, we will expand the use of alumni visits, career/graduate career panels, and field trips so students can see the degree in action.
Executive Summary

1. Key Findings
   SFR first-year retention is 79% (averaged over four years). Key program initiatives for student retention include:
   1. Having SFR students attend a 1 week field camp prior to the start of classes.
      a. The students learn about the majors; are they a good fit for the major
      b. Students build a support network among themselves and with the instructor that lasts through the first year and beyond
   2. Teaching a number of SFR courses during the first year to keep class sizes moderate to small, and to keep the SFR first-year cohort together.
   3. Provide mentoring session for 5-6 first-year students who meet with a faculty member and 1-2 current students from fall break to Thanksgiving break. The sessions are used to help first-year students express their positive experiences and their anxieties. Current students provide responses that reflect how students can best cope with the first-year challenges.
   4. Provide easy access to student organizations such as SWIFT (Supporting Women in Forestry Today, Student Chapter for the Society of American Foresters, Outing Club, Woodsmen's Team)
   5. The field camp, mentor groups, taking courses as a cohort with SFR faculty, and student groups creates an excellent sense of community in Nutting Hall.

2. Key Components of Plan to Improve Student Success and Timeline for Implementation
   1. A survey on student satisfaction will complete its second year in May 2019. Data from the survey will be summarized by September 2019.
   2. The Counseling Center was agreed to participate in a workshop later this spring or early next fall to explore ways to make the first-year mentor group meeting more effective.
B.S. in Forestry (FTY); Parks, Recreation and Tourism (PRT); and Forest Operations, Bioproducts, and Bioenergy (FBB)
First Year Curriculum

<table>
<thead>
<tr>
<th>1. Fall Semester</th>
<th>Cr.</th>
<th>2. Spring Semester</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFR 101</td>
<td>2</td>
<td>SFR 100</td>
<td>3</td>
</tr>
<tr>
<td>Intro to Forest Resources</td>
<td></td>
<td>Intro to Forest Biology</td>
<td></td>
</tr>
<tr>
<td>SFR 103</td>
<td>1</td>
<td>SFR 102</td>
<td>1</td>
</tr>
<tr>
<td>Intro to Forest Resource Professions</td>
<td></td>
<td>Biology of Woody Plants Laboratory</td>
<td></td>
</tr>
<tr>
<td>SFR 106</td>
<td>1</td>
<td>SFR 201</td>
<td>0</td>
</tr>
<tr>
<td>Forest Land Navigation and Outdoor Preparedness</td>
<td></td>
<td>Wildland Firefighter Preliminary Training</td>
<td></td>
</tr>
<tr>
<td>SFR 107</td>
<td>3</td>
<td>SFR 205</td>
<td>3</td>
</tr>
<tr>
<td>Forest Vegetation</td>
<td></td>
<td>Forest Measurements &amp; Statistics</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(PRT: SFR 105 – Introduction to Tourism)</td>
<td></td>
</tr>
<tr>
<td>SFR 220</td>
<td>3</td>
<td>SFR 222 or CMJ 103</td>
<td>3</td>
</tr>
<tr>
<td>Environment and Society</td>
<td></td>
<td>Environmental Communication Skills OR intro. to Public Speaking</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT 122</td>
<td>4</td>
<td>ENG 101</td>
<td>3</td>
</tr>
<tr>
<td>Pre-Calculus</td>
<td></td>
<td>College Composition</td>
<td></td>
</tr>
<tr>
<td>(FBB: MAT 126 – Calculus)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SFR 226</td>
<td>3</td>
<td>ECO 120</td>
<td>3</td>
</tr>
<tr>
<td>General Education Elective or Park Systems of the World</td>
<td></td>
<td>Principles of Microeconomics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>TOTAL</td>
<td>16</td>
</tr>
</tbody>
</table>

1. Required First-Year Curriculum
   There are three programs in SFR: Forestry (FTY); Parks, Recreation and Tourism (PRT); and Forest Operations, Bioproducts, and Bioenergy (FBB). By intent, all three programs share much in common the first year. There is no difference between the required and recommended curricula. The table above outlines the requirements for the FTY curriculum. Differences for the FBB and PRT curricula are indicated in ( ).

   a. Courses in the discipline
   SFR 101, SFR 103, SFR 106, SFR 107, and SFR 220 are required courses in the discipline during the fall semester. SFR 100, SFR 102, SFR 201, SFR 205 (or SFR 105 for PRT students) are required of all SFR majors in their second semester. SFR 226 is optional, as is SFR 222.

   b. Gen Ed Courses
   The following required courses meet General Education requirements at UMaine.
   - MAT 122/126: Quantitative Literacy.
   - SFR 220: Population and the Environment and Western Cultural Traditions
c. Other courses that meet major requirements
There are no other courses that meet major requirements in the first year.

2. What is the recommended first-year curriculum?
There is no difference between the required and recommended curricula.

3. Why is this the required/recommended first-year curriculum?
SFR first-year curricula are designed to develop a knowledge base required for students to be successful/prepared to tackle upper level coursework in years two, three, and four. Also, the education prepares students for summer jobs and internships after the first year.

a. What are the expected student-learning outcomes?
Year one curriculum is designed to lay the foundation for upper level course-work in FTY, PRT, and FBB. Students are expected to learn and demonstrate competency in the following areas after completing year one.

- Prepare and deliver effective oral presentations: SFR 222
- Comprehend and critically evaluate information presented in a variety of writing styles and compose essays, papers, and reports that effectively communicate ideas: ENG 101, SFR 220, SFR 222
- Understand physical and chemical properties, measurements, and states of matter: SFR 100
- Identify forest and other tree species, their distribution, and associated vegetation and wildlife: SFR 100, SFR 101, SFR 107
- Explain ecological concepts and principles including the structure and function of ecosystems, plant and animal communities, competition, diversity, population dynamics, succession, disturbance, and nutrient cycling: SFR 100
- Interpret and explain the components, patterns, and processes of biological and ecological systems across spatial and temporal scales: SFR 107
- Explain basic concepts of molecular biology, cells, organisms, populations, species, communities, and ecosystems: SFR 100, 102
- Master concepts in tree biology: SFR 100, 102
- Use computers and other technologies for communication, measurement, analysis, and problem solving: SFR 103, 205, 207
- Identify and measure land areas and conduct spatial analysis: SFR 106, 207
- Design and implement comprehensive and appropriate forest resource inventories:
SFR 205, SFR207
- Apply basic approaches and applications of mathematics, linear programming, and statistics for analysis and problem solving: SFR 205
- Understand how resource conditions and social demands interact under various market and non-market structures to influence the valuation and availability of forest-related goods and services: ECO 120
- Understand how the existence of market externalities, ecosystem services, and non-market goods and services affect forestry decisions and resource conditions: SFR 103, SFR 220
- Evaluate moral and ethical questions by using critical reasoning skills: SFR 103, 220
- Understand social and economic structures, processes, and institutions across a broad range of human experience and culture: SFR 220
- Understand the administration, ownership, organization, human resource, and legal aspects of forest management enterprises: SFR 103, SFR 220
- Recognize various harvesting, transportation, and processing systems used in the management of forest resources and production of forest products. (FTY and FBB only): SFR 209

b. How successful is this curriculum at producing expected outcomes
The first year curricula are not assessed directly. Primary assessment occurs in the senior year with capstone projects. In 2018, 18 FTY students, 8 PRT students, and 2 FBB students met expectations for the capstone projects. One FTY student did not complete the capstone project to expectations.

Other indicators of successful first-year curricula are retention rates, which is 71.25% for SFR majors (data from OIR).

4. What are the risks associated with this curriculum?
The highest rates for DFW are for non-SFR courses: MAT 126 (38%), MAT 122 (35%), and ENG 101 (16%). DFW rates for SFR courses are SFR 100 – 26%, SFR 205 – 15%, SFR 226 – 15%, SFR 107 – 12%, SFR 222 – 10%, SFR 103 – 7%, SFR 220 – 5%, SFR 102 – 5%, SFR 105 – 5%, SFR 106 – 4%, SFR 101 – 3%.

The first-year curricula in SFR are similar across all three majors. This helps students switch between majors within SFR without creating difficulties in enrolling for future classes. The curricula are highly defined. Therefore, the risks for student low retention are low.

5. In light of risk assessment, what are the alternative first-year curricula?
The current first-year curricula has been successful in retaining students and in preparing them for future classes. Alternatives are not needed.
6. What practices, resources, and/or tactics are in place to mitigate risks?
SFR has the following programs in place—both inside and outside of the classroom— to reduce risks and increase retention of SFR students:

Retention Activities:
- **SFR 101 Field Camp:** SFR students attend a 1 week field camp prior to the start of classes.
  - The students learn about the majors; are they a good fit for the major
  - Students build a support network among themselves and with the instructor that lasts through the first year and beyond
- Teaching a number of **SFR courses** during the first year to keep class sizes moderate to small, and to keep the SFR first-year cohort together.
- Provide **mentoring session** for 5-6 first-year students who meet with a faculty member and 1-2 current students from fall break to Thanksgiving break. The sessions are used to help first-year students express their positive experiences and their anxieties. Current students provide responses that reflect how students can best cope with the first-year challenges.
- Provide easy access to **student organizations** such as SWIFT (Supporting Women in Forestry Today, Student Chapter for the Society of American Foresters, Outing Club, Woodsmen’s Team).
- **Nutting Hall Community:** The field camp, mentor groups, taking courses as a cohort with SFR faculty, and student groups creates an excellent sense of community in Nutting Hall.
- The interconnectedness/relatedness of FTY, PRT, and FBB majors within SFR allow **student mobility** to similar majors within the School of Forestry and help promote retention.
- **Scholarships:** We offer over $300,000 in scholarships each year to incoming and returning students, which provides students with incentives and motivation for staying with our programs.
- **Jobs:** Active research programs within SFR provide job opportunities for first-year students to work with faculty and graduate students. The University Forest hires students and provides them with practical experience. The EES Job Fair in Nutting Hall helps to connect students to the SFR and related job opportunities. SFR’s broad network of professional businesses and organizations provide student access to numerous jobs during school year, summer, and post-graduate placement.
- **Academic improvement meetings:** Undergraduate Coordinator invites all students with a GPA of <2.0 to participate in weekly meetings where together they set goals and students are held accountable for those goals.

7. What additional steps can be taken to mitigate risk?
1. SFR has implemented a survey to track student attitudes about the school and our degree programs. This survey seeks to gather information from students enrolled in the
School of Forest Resources. Specifically, the survey gathers survey data from students to determine their perceptions of the various aspects of the SFR program. The information gathered from this survey will help to document the opportunities and barriers that presently exist in this program and will provide the SFR program personnel with an objective evaluation of the ways in which the program has been successful as well as the areas in need of improvement. The 2017-18 cohort took the survey in September 2017, January 2018, May 2018, and September 2019. The 2018-19 cohort took the survey in September 2018 and January 2019. To keep surveys anonymous, the Center for Innovation in Teaching and Learning is combining the survey results with demographic data from Institutional Research. We hope to have results later this spring. The survey method has been approved by the IRB.

2. The Counseling Center has agreed to participate in a workshop later this spring or early next fall to explore ways to make the first-year mentor group meetings more effective.
Executive Summary

1. Key Findings

The Marine Science major has the third highest first-year retention rate within the College of Natural Sciences, Forestry, and Agriculture behind Nursing and Communication Sciences and Disorders (two professional programs, one with a capped enrollment, where students tend to have a better understanding of the major they are pursuing).

The School of Marine Sciences places considerable effort and resources on the goal of maximizing first-year student success. The advising model we use has our Program Coordinator, Prof. William Ellis, serve as the advisor for all first-year and transfer students, and he teaches our first-year success seminar, NFA 117 – Issues and Opportunities. Over the last 15 years we have adjusted our curriculum so first-year students no longer take chemistry. In the sophomore fall students complete Chemistry I. In the spring of sophomore year students complete Chemistry II and Physics I. In other words, our students are not doubled-up on two difficult lab sciences until their fourth semester in college. With respect to math, our majors are required to complete calculus I and statistics. We now allow students to complete MAT 116 as an alternative to MAT 122 (pre-calculus) and MAT 126 (calculus I). By far, the three biggest hurdles for our majors are chemistry, physics and math.

In addition, SMS offers free, unlimited tutoring to all students in the major. We also run a “Boot Camp” at the Darling Marine Center the week before classes to build cohesion among many members of the incoming, first-year class. First-year students seeking research experience within the major are often hired in their first year which gives them a sense of belonging and a feeling of commitment to the program. First-year students also have the opportunity to participate in two student organizations within SMS, the Marine Sciences Club and the Coral Club. Both clubs offer students the opportunity to interact with upper-level students and, again, feel connected to the major.

Financial issues can also be another reason students struggle in their first year. We reserve some of our scholarship money each year to support students that face financial hardship.
2. **Key Components of Plan to Improve Student Success and Timeline for Implementation**

We still need to continue to improve our free tutoring program. Some semesters it is a struggle to find enough tutors for Math, Chemistry and Physics. We would like to formalize a relationship with these departments where we have easy access to their students as tutors in addition to our own Marine Science majors. We are willing to pay the students out of our own departmental budget.

We are looking forward to the use of Navigate to communicate with students at the department-level during the summer. Jodie Feero in our main office does an incredible job early in the summer communicating with students and helping to build their schedules. Through this communication we hope to adjust student schedules on an individual basis so they will be more successful. Some of these adjustments include moving math classes to a different semester if possible, or looking at the summer term as an option.

We would also like to find the resources to increase the number of students that can participate in Boot Camp or visit Orono during the summer (in addition to orientation). We believe (as does the Assoc. Dean of NSFA) increased contact over the summer will help prepare students for the transition from high school to college.

Lastly, we are trying to find ways to increase the amount of scholarships we are able to award first-year students, and students trying to return for their second year. Many of our students are unable to register for their spring semester classes of their first year, or fall semester of their second year, due to a financial hold on their account. More job placements within the major would also help students financially and with respect to being more engaged.

**Timeline:**

- **Summer 2019** – work with math, chemistry and physics to formalize a tutoring relationship.
- **Fall 2019** – begin exploring ways to increase enrollment in Boot Camp.
- **Fall 2019/Spring 2020** – begin exploring ways to increase scholarship awards and find more job placements for undergraduates within SMS.
Marine Science B.S. Program
Recommended First Year Curriculum

<table>
<thead>
<tr>
<th>1. Fall Semester</th>
<th>Cr.</th>
<th>2. Spring Semester</th>
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</tr>
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<tbody>
<tr>
<td>SMS 100</td>
<td>3</td>
<td>SMS 201</td>
<td>3</td>
</tr>
<tr>
<td>BIO 100</td>
<td>4</td>
<td>SMS 203</td>
<td>3</td>
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<td>MAT XXX</td>
<td>3-4</td>
<td>SMS 108</td>
<td>3</td>
</tr>
<tr>
<td>ENG 101 or HON 111</td>
<td>3-4</td>
<td>Gen Ed or HON 112</td>
<td>3-4</td>
</tr>
<tr>
<td>NFA 117</td>
<td>1</td>
<td>MAT XXX</td>
<td>3-4</td>
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<tr>
<td>TOTAL</td>
<td>14-16</td>
<td>TOTAL</td>
<td>13-15</td>
</tr>
</tbody>
</table>

1. Required First-Year Curriculum
   a. Courses in the discipline
      A typical fall first-year student in the Marine Science major is enrolled in SMS 100, BIO 100, ENG 101 or HON 111, MAT 111 or 122 or 126 or STS 232, and NFA 117. Additional Gen Ed. courses are used to get the students to 15 credits.
      
      A typical spring schedule includes SMS 201, SMS 203, SMS 108, HON 112 or Gen Ed, MAT 122 or 126 or STS 232. Additional Gen Ed. courses are used to get the students to 15 credits.
      
      Courses in the first year in the discipline are SMS 100, SMS 201, SMS 203, SMS 108, NFA 117. Please see the attached 4-year plan that is given to all students in NFA 117 (below).
   
   b. Gen Ed Courses
      BIO 100 meets the Gen Ed requirement for Laboratory in the Basic or Applied Sciences. SMS 100 meets the Applications of Scientific Knowledge and Population and the Environment. ENG 101 meets the Writing Intensive Gen Ed requirement. SMS 108 includes another three credits of HVSC Gen Ed credit under Population and the Environment.
      
   c. Other courses that meet major requirements
      The following courses taken in the first year are required for the BS in marine science and are outside of our department: BIO 100 and math.

2. What is the recommended first-year curriculum?
   Same as the required first-year curriculum.
3. Why is this the required/recommended first-year curriculum?

This curriculum introduces the students to the major and gives them the foundational knowledge to move to the second year. BIO 100 and SMS 100 are both pre-requisites for SMS 201/203 in the spring semester. SMS 201 is a pre-requisite for almost all of our upper-level electives taken during the second through fourth years. Students typically need to complete some level of math during the first two semesters (and/or summer) to be successful in chemistry and physics in their second year.

a. What are the expected student-learning outcomes?

The School of Marine Sciences has developed a set of outcomes for students pursuing and completing a degree in marine science. After successfully completing a degree in marine science, students will be able to:

I. Communicate effectively through their writing and oral presentations.

II. Demonstrate a comprehensive knowledge of the marine environment including the relationship of the fields of biology, geology, chemistry and physics.

III. Demonstrate proficiency in the collection, analysis and interpretation of scientific data pertaining to the marine environment using modern techniques.

IV. Understand the role of the primary literature and its review process in science, and have an introduction to its content.

V. Synthesize prior learning to formulate and address scientific questions.

The courses we recommend above in the first year help students work towards several of these expected outcomes.

b. How successful is this curriculum at producing expected outcomes

For the SMS recommended courses, using SMS specific course data when available and overall course UMaine data when SMS data not available, student success rates are as follows: BIO 100 (89%), ENG 101 (87%), MAT 122 (70%), SMS 100 (83%), MAT 126 (53%), SMS 108 (87%), SMS 201 (70%), and SMS 203 (92%). Of the recommended first-year courses the area of most concern is mathematics, with MAT 122 have a success rate of 70%, but MAT 126 have a success rate of only 53%. Due to our students struggling with MAT 126, we now accept MAT 116 as an option to meet the calculus I requirement.
Based on faculty perceptions and many discussions with the SMS curriculum committee, we feel that our first-year curriculum does an excellent job preparing our students for their second year and beyond. The one thing our faculty continues to notice throughout a student’s career in our major is the overall lack of ability regarding math.

4. **What are the risks associated with this curriculum?**
   Many of our students struggle with math.

5. **In light of risk assessment, what are the alternative first-year curricula?**
   We have come up with several solutions to the math problem. First, we now accept MAT 116 in place of MAT 122 and MAT 126 for students that need this path to be successful in our program. We also work with students that identify themselves as worried about math. Sometimes this includes a plan that has the students completing math classes in the summer, and replacing math courses during the academic year with Gen Ed courses.

6. **What practices, resources, and/or tactics are in place to mitigate risks?**
   We offer free, unlimited tutoring to all of our students. We pay for this out of our operating budget. Prof. Ellis spends a great deal of time in NFA 117 working with students regarding things they will need to do during the semester to be successful. He also spends time helping the students identify the resources they will need to be successful.

7. **What additional steps can be taken to mitigate risk?**
   We are looking forward to the use of Navigate to communicate with students at the department-level during the summer. Jodie Feero in our main office does an incredible job early in the summer communicating with students and helping to build their schedules. Through this communication we hope to adjust students’ schedules on an individual basis so they will be more successful. Some of these adjustments include moving math classes to a different semester if possible, or looking at the summer term as an option.

   We would also like to find the resources to increase the number of students that can participate in Boot Camp or visit Orono during the summer (in addition to orientation). We believe (as does the Assoc. Dean of NSFA) increased contact over the summer will help prepare students for the transition from high school to college.
## Marine Science
### 4-Year Plan

Name: **Marine Biology Concentration, SBS Senior Year**

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<th>Fall Y1</th>
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<tbody>
<tr>
<td>BIO 100 (4)</td>
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**Total Credits = 15**

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<tr>
<td>STS 232 (3)</td>
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<td>CHY 122/124 (4)</td>
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<td>PHY 121 (4)</td>
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<tr>
<td>Gen. Ed. (3)</td>
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**Total Credits = 16**
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<tr>
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<td>BMB 280 (3)</td>
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<tr>
<td>BMB 221/222 (4)</td>
<td>SMS 404 (1)</td>
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<td>SMS Elec. (3)*</td>
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<tr>
<td>SMS 303 (2) or Est. Oc. @ SBS</td>
<td>Gen. Ed. (3)</td>
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<tr>
<td>SMS Elec. (3)*</td>
<td>Free Elec. (3)</td>
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<td>SBS (~ 15 credits)*</td>
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<td></td>
<td>SMS Elec. (3)*</td>
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<tr>
<td></td>
<td>Free Elec. (3)</td>
</tr>
<tr>
<td>total credits = 16</td>
<td>total credits = 13 - 14</td>
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</table>

Notes: Students need 21 credits of upper-level SMS electives, and 120 credits total.

If a student is in the Honors College, they do not need to take ENG 101 or other general education courses. They would take:

HON 111 (4) Fall 1st Year
HON 112 (4) Spring 1st Year
HON 211 (4) Fall 2nd Year
HON 212 (4) Spring 2nd Year
HON 498 (3) Fall Senior Year (instead of SMS 400)
HON 499 (3) Spring Senior Year (instead of SMS 400)
Executive Summary

1. Key Findings
   - The first year course sequence is not malleable if students want to stay on track to graduate in 4 years. On a case-by-case basis we can delay high DFWL courses, but it would delay graduation unless made up during the summers.
   - Our academic majors (BCH, MCB, MLB) are extremely rigorous, and the first year curriculum has more than one class with high DFWL rates (CHY 121/123; CHY 122/124; MAT 126, MAT 127).
   - Students that are academically prepared for college, with good quantitative skills, tend to fare better than those that are not. Our academic majors are all quantitative disciplines. Success for our students is dependent on good quantitative scores in Math Placement, MAT SAT, and AP scores (MAT, CHY). We note that CHY has increased its AP scoring requirement for CHY 121/123 and CHY 122/124 credit.
   - We have a Howard Hughes Medical Institute-funded course in Phage Genomics that was initially only offered to Honors students; but, with monies from the Provosts and Associate Deans Office, that has been expanded to all of our first-year majors, plus the Honors students across the University. This learner-centered model for science education combines research, active learning, and student mentoring. Data gathered from this course demonstrates that our students score higher than the national average on several psychological measures that influence retention.
   - We have several courses which include undergraduate teaching assistants and Maine Learning Assistants to serve as peer mentors and/or instructors, including lynchpin courses in the first three semesters of our program. The faculty have decided to allocate additional departmental resources to expand the number of teaching assistants and Maine Learning Assistants in other courses in our program.
   - First Year Retention Rates: The University of Maine first year retention rate for Fall 2016–Spring 2017 was 75%. The College of Natural Sciences, Forestry, and Agriculture first year retention rate averaged over four years was 77%. The Department of Molecular and Biomedical Sciences first year retention rate was 85%. The associate dean’s office, based on a statistical analysis of grades reports that our students in generally are well prepared for laboratory sciences, and thus do not have the same STEM course difficulties that many majors experience.

2. Key Components of Plan to Improve Student Success and Timeline for Implementation:

   Our faculty are cognizant of the link between providing research experiences in the first year of college and increased persistence in STEM disciplines (references provided below). We intend to continue to incorporate as many research opportunities for our students as possible. We applied for an intermediate HHMI course to partner with Phage Genomics, but were not funded. The SEA PHAGES course (Phage Genomics BMB 150/HON 150 and BMB 155/HON 155) at UMaine is an ideal, learner-centered, model for science education with its three integrated classroom components: fundamental research, active or student-centered learning, and student mentoring from teaching assistants and instructors.

   In our unit, many of our courses include graduate or undergraduate (or both) teaching assistants and/or Maine Learning Assistants. Both BMB 150 and 155 (part of the first year curriculum) have a graduate and an undergraduate teaching assistant in the classroom, and BMB 155 has employed Maine Learning Assistants. BMB 300 (a second-year first semester course required by all of our majors) also includes an undergraduate teaching assistant and three Maine Learning Assistants. This course sequence (BMB 150 to 155 to 300) is designed to prepare all of our students for their upper-level courses and peer
mentoring and instruction have been incorporated into these courses to help students succeed in our program. (Data regarding student performance in BMB 300 as a metric for the suitability of our first year curriculum can be found later on in this report). Additionally, at our most recent faculty meeting, a decision was made to incorporate more teaching assistants into classes with a higher (>50 students) enrollment to enhance the quality of our instruction, including courses taken by students from outside of our program (BMB 207, 208, 221, 322). Maine Learning Assistants are already utilized in BMB 322, and the success of our increased use of teaching assistants and Maine Learning Assistants in these aforementioned courses has led to increased interest in their use by our faculty at large. Grant submissions are currently in preparation to the RiSE Center for MLAs in BMB 207, 208, and 221 for Fall 2019/Spring 2020.

Literature on Research Experiences and Persistence in STEM Fields:


Biochemistry/Microbiology/Molecular & Cellular Biology B.S. Program
First Year Curriculum

<table>
<thead>
<tr>
<th>1. Fall Semester</th>
<th>2. Spring Semester</th>
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</thead>
<tbody>
<tr>
<td>CHY 121  Introduction to Chemistry</td>
<td>BMB 280 Introduction to Molec &amp; Cellular Biol</td>
</tr>
<tr>
<td>CHY 123  Introduction to Chemistry Lab</td>
<td>BIO 200 or BMB 155 Biology of Organisms</td>
</tr>
<tr>
<td>BIO 100 or BMB 150 Basic Biology</td>
<td>CHY 122 Molec Basis of Chemical Change</td>
</tr>
<tr>
<td>MAT 126  Calculus I</td>
<td>MAT 127 For BCH and MLB Majors Only</td>
</tr>
<tr>
<td>NFA 117  Issues &amp; Opportunities</td>
<td></td>
</tr>
<tr>
<td>ENG 101  College Composition (or HON Series)</td>
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<tr>
<td>total 16-17</td>
<td>total 14-16</td>
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1. Required First Year Curriculum

a. Courses in the discipline

First semester:
- We try to register all first year students and transfers in the Howard Hughes Medical Institute (HHMI) course BMB 150/HON 150 Phage Genomics I. We accept BIO 100 if registration in BMB 150/HON 150 is not possible due to scheduling conflicts. In year one of the grant we had funding for 20 HON students only. The next year we expanded the offering to all of our first year students and had two sections and 44 slots; but still more students than available seats. Some late-registering first year students could not fit either of the two phage genomics sections into their schedule without sacrificing CHY 121/123 or MAT 122/126. These students were registered for BIO 100 and were encouraged to pick up the Phage Genomics sequence in Year 2, as we do with mid-year first year transfer students, or to continue on with BIO 200. We now have three sections and 64 available seats for HON students and our majors in Phage Genomics. The same course is taught to HON and non-HON students.
- We like our students to take MAT 126 and initiate the Calculus sequence as early as possible; if not, at least MAT 122 Pre-Calculus. Anything less also precludes them from starting CHY 121/123 their first semester.

Second Semester
- BMB 280 Introductory Molecular Biology (required for all subsequent BMB courses), BIO 200 (or BIO 208), or BMB 155/HON 155.
- We try to register all FY students and transfers in the HHMI course BMB 155/HON155 Phage Genomics II. We accept BIO 200 or BIO 208 if registration in BMB 155/HON 155 is not possible.
• MAT 127—ONLY for BCH and MLB Majors. We’d prefer that our students complete their Calculus requirements as early as possible; but many of our HON students delay MAT 127 until year 2 due to load limits.

b. Gen Ed Courses
• ENG 101 (or HON 111/112) satisfies the UMaine General Education requirement in Writing Competency and we place as many students as possible in this course (usually we are allocated about one-third of the seats in ENG 101 as our number of matriculated first-year students). Students that aren’t able to take ENG 101 due to availability or don’t need it due to AP credits, take a General Education elective in Human Values and Social Contexts and/or Ethics. Others pick up ENG 101 second semester.
• Microbiology students aren’t required to take MAT 127 and take at least one General Education elective in Human Values and Social Contexts and/or Ethics in its stead.

c. Other courses that meet major requirements
• There are no other courses that satisfy major requirements in either semester.

2. What is the recommended first-year curriculum?
See table above.

3. Why is this the required/recommended first year curriculum?
Except for BMB 150/HON 150/BMB 155/HON 155 replacing BIO 100/BIO 200, respectively); with MAT 126/127, BMB 280, and CHY 121–124 in the first year, the curriculum for all three BS programs is one that prepares them for Organic Chemistry in their second year. Our students must complete MAT 126 (and MAT 127 for BCH, MLB Majors) and CHY 121–124 in their first year/summer so that they can go on to CHY 251–254 in their second year. These courses are prerequisites for BMB 300/305, and BMB 360/323 that they must take in their second year, and are prerequisites for all third and fourth year courses.

a. What are the expected student-learning outcomes?
We expect students to be prepared to advance into Organic Chemistry CHY 251–254 and ≥300-level BMB courses in their second year. They must have mastered General Chemistry CHY 121–124, MAT 122/126), and have a year of Biology under their belts.

b. How successful is this curriculum at producing expected outcomes?
• This curriculum is successful IF students can negotiate the MAT and CHY first-year requirements. First Year Retention Rates: The University of Maine First Year retention rate for Fall 2016–Spring 2017 was 75%. The College of Natural Sciences, Forestry, and Agriculture First Year retention rate averaged over four years was 77%. The Department of Molecular and Biomedical Sciences First Year retention rate was 85%. The statistics indicate that M&BMS is outperforming the University and the College in terms of retention of first-year students.
• One metric of success for our program is performance of students in our program in BMB 300, which is taken in the first semester of year 2 (students in other programs, with the exception of Medical Laboratory Sciences, typically take BMB 300 in the 3rd or 4th year of their program). In fall 2018, M&BMS students averaged a final grade of 2.7/4.00 (n=46), with students from all other programs averaging a final grade of 2.17/4.00 (n=83). When these (non-M&BMS) students are broken up by program, the trend still continues with students from our program outperforming all other programs. It should be noted that 41% of M&BMS students scored a 3.7 or better in BMB 300
(19/46 students) in fall of 2018, comprising almost 56% of the total students in that grade cohort. While there are many factors that may account for these data, the success of our students in a core program course suggests that our first-year curriculum is adequately preparing students in our program for their future courses. The associate dean’s office reports that our students tend to earn on average a half letter grade above the college as a whole, in CHY 121.

4. What are the risks associated with this curriculum?

The risks for our majors are that they are not adequately prepared for General Chemistry (121/123) and MAT 122/126 in their first semester. If we have DFWL situations among first-years, it’s almost always related to CHY 121/123 or MAT 122/126, or to financial constraints that force the student to not enroll for the second semester. This should not necessarily be an indictment of CHY or MAT. Our department has observed that the best predictor of success among our first-year BCH, MCB, and MLB majors is their MAT preparation and scores on quantitative sections of the SAT and ACT.

5. In light of risk assessment, what are the alternative first-year curricula?

We feel there are no current uniform risks for most students. However, on a case by case basis we can offer the option of delaying MAT, and possibly even General Chemistry until year two. This would likely result in a five-year program of study. It would also preclude any of our students from being selected for Early Admission (after two years) to the Tufts Medical School Early acceptance program. Three students in BMB 490 lab fall 2018 were admitted after two years—so we have a significant number of students in our department who are accepted for this program each year.

6. What practices, resources, and/or tactics are in place to mitigate risks?

The National Howard Hughes Medical Institute Program SEA PHAGES (Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science) course (aka: Phage Genomics BMB 150/HON 150 and BMB 155/HON 155) at UMaine is an ideal, learner-centered, model for science education with its three classroom-laboratory components: fundamental research, active or student-centered learning, and student mentoring from teaching assistants and instructors. We launched the "Phage Enrichment" program in Fall of 2017 to support all students in the phage genomics course (first-year and transfer students) in their transition to UMaine and to enhance a sense of belongingness in our BCH, MCB and MLB majors. In this program, students meet with trained undergraduate and graduate teaching assistants to learn basic learning skills (i.e. study skills, time management), writing skills and to receive support in learning course-related content. To assess the impact of our curriculum on the likelihood of student retention, we use the "Persistence in the Sciences Survey," a validated assessment designed by Dr. David Hanauer of HHMI SEAPHAGES program (Hanauer et al. 2016 and Hanauer et al. 2017). Data from these surveys at UMaine were included in the recent Hanauer et al. (2017) publication in PNAS. In Brief, UMaine Phage Genomics students score higher than national averages in all 6 psychological measures related to retention: Project Ownership (students feeling of engagement and ownership to their research project); Project Ownership Emotion (student has positive emotive response to their class research); Self-efficacy (student feels confident in function as a scientist); Science identity (student thinks about themselves as a scientist); scientific community values (student has affinity to the values of community; and Networking (students are talking about their research in both professional and personal networks). In year one of the HHMI grant we had funding for 20 HON students only. The next year we expanded the offering to all of our first years and had two sections with 44 slots. We now have three sections and 64 available seats for HON students across the University and our majors. The same course is taught to all students.
7. **What additional steps can be taken to mitigate risk?**

Additional steps to mitigate risk focus on our commitment to providing a program that includes as much research experience as early as possible in the curriculum, and to include peer mentors and instructors to help students cope with the transition to college. As mentioned above, our faculty are committed to ensuring that both of these steps are taken into consideration. At the course level, we continue to work on grant submissions for modifications of existing courses to include more research experiences, primarily at the intermediate level of our program, and to incorporate additional undergraduate teaching assistants and Maine Learning Assistants to enhance our instructional practices. The addition of these undergraduates in the classroom and the laboratory facilitate peer mentoring and instruction, providing additional resources for students that may be struggling to adapt. Our increased use of teaching assistants and Maine Learning Assistants will allow us to provide more individualized instruction to our students to ensure their continued success in our program.

8. **Further Findings**

- Our faculty have noticed an increase in students who are less mature and less capable of being advocates for themselves, managing their responsibilities, “self-efficacy”, and navigating MaineStreet.
- Social barriers: A number of our faculty have noticed that the most recent groups of matriculated students appear to be far less mature and responsible than those just five years ago. They appear to be much more poorly prepared to transition to College than were their predecessors. Many students just E-mail their advisors with requests for simple tasks that they should know how to perform on their own. It’s been our recent experience that many first-years have to be dealt with like one would deal with a high school student. Another telling sign is that we have an increasing number of parents E-mailing/calling faculty to resolve issues for their sons/daughters. The students themselves should be handling these, and have the training and tools to handle these tasks.
Executive Summary

1. Key Findings

- The first year curriculum is driven by the Maine State Board of Nursing and the Commission on Collegiate Nursing Education (CCNE), the accrediting agency for the School of Nursing. Nursing designated courses are also required in the first year curriculum to introduce nursing students to nursing concepts and the role of the nurse. The curriculum has little flexibility if a student is to progress graduate in 4 years.
- Nursing is fairly unique with high internal academic standards. That said, Nursing has one of the highest retention rates in the college, averaging 88% over four years, and high first year success rates in courses that many first year students struggle with, e.g. BIO 100 (96%), and PSY 100 (94%).
- First year curriculum consists of 15-16 credits per semester with a heavy workload. As a preventative measure, students are often advised to some of the courses during winter term or summer term to reduce credit loads during the semester.

2. Key Components of Plan to Improve Student Success and Timeline for Implementation

**Stretching out high risk courses:** Nursing is in discussion with the Biology and the Molecular and Biomedical Science departments to separate anatomy and physiology and microbiology courses that occur in the same semester, and to increase the number of available seats to accommodate the large number of first year nursing students.

**Marketing Student Success Programs:** We will ramp up our efforts to market tutoring services, peer mentoring through Orono Student Nurses Association (OSNA), and online course tutoring (Net Tutoring) early in students’ academic careers. Making students aware of these resources early and often would be beneficial.

**Reducing course size:** Beginning fall 2019, NUR 101 will be taught in two sections to lower the number of students in the class. This should help increase connections between the instructor/advisor with the students and identify any problems before they occur.

**Building community:** Another plan for the fall 2019 semester is to work with Residence Life to request the creation of Living Learning Communities for nursing students. Faculty will also encourage participation in student organizations such as the Orono Student Nursing Association.
Nursing B.S. Program
Recommended First Year Curriculum

<table>
<thead>
<tr>
<th>1.</th>
<th>Fall Semester</th>
<th>Cr.</th>
<th>2. Spring Semester</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 100</td>
<td>Basic Biology</td>
<td>4</td>
<td>BIO 208</td>
<td>Anatomy and Physiology</td>
</tr>
<tr>
<td></td>
<td>Required Curriculum / GE</td>
<td></td>
<td></td>
<td>Required Curriculum</td>
</tr>
<tr>
<td>BMB 207</td>
<td>Fundamentals of Chemistry</td>
<td>3</td>
<td>BMB 240</td>
<td>Microbiology for the Professional Nurse</td>
</tr>
<tr>
<td></td>
<td>Required Curriculum</td>
<td></td>
<td></td>
<td>Required Curriculum</td>
</tr>
<tr>
<td>BMB 209</td>
<td>Fundamental of Chemistry Lab</td>
<td>1</td>
<td>BMB 241</td>
<td>Microbiology for the Professional Nurse Lab</td>
</tr>
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<td></td>
<td>Required Curriculum</td>
</tr>
<tr>
<td>FSN 100</td>
<td>Intro to Nutrition</td>
<td>3</td>
<td>MATH / GE</td>
<td>GE</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENG 101</td>
<td>English Composition</td>
<td>3</td>
<td>NUR 102 / NUR 103</td>
<td>Foundation of Nursing Practice I or II</td>
</tr>
<tr>
<td></td>
<td>Required / GE</td>
<td></td>
<td></td>
<td>Required Curriculum</td>
</tr>
<tr>
<td>NUR 101</td>
<td>Issues and Opportunities of Nursing</td>
<td>1</td>
<td>PSY100 / SOC 101</td>
<td>General Psychology / Intro to Sociology</td>
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<td></td>
<td>Required Curriculum</td>
<td></td>
<td></td>
<td>Required Curriculum / GE</td>
</tr>
<tr>
<td>TOTAL 15</td>
<td></td>
<td></td>
<td>TOTAL</td>
<td></td>
</tr>
</tbody>
</table>

1. Required First-Year Curriculum
   a. Courses in the discipline
      NUR 101 – Issues and Opportunities in Nursing
      NUR 102 – Foundations of Nursing Practice I
      NUR 103 - Foundations of Nursing Practice II
      BMB 240/241 – Microbiology for Nursing

   b. Gen Ed Courses
      - BIO 100 meets Gen Ed requirements for Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences and is a pre-requisite for BIO 208
      - BMB 207/209 meets requirement for BMB 240/241
      - PSY 100 – Meets requirements for Social Context and Institutions as well as Nursing
      - SOC 101 – Meets requirements for Social Context and Institutions as well as Nursing
      - MATH – Students are required to take MAT 122. If student does not successfully
pass part II of the math placement test, they take MAT 111. Required Quantitative Literacy / Requirement for Nursing.
- ENG 101 – General Education Writing Requirement

c. Other courses that meet major requirements
- BMB 240/241 – This Microbiology course focuses on concepts that are specifically related to knowledge needed for the professional nurse
- FSN 101 – Required by Maine State Board of Nursing and CCNE / Nursing requirement.

2. What is the recommended first-year curriculum?
   The above stated curriculum is the recommended/required first year curriculum.

3. Why is this the required/recommended first-year curriculum?
   Each year of the four-year Nursing curriculum is largely determined by accreditation requirements of the Maine State Board of Nursing and Commission on Collegiate Nursing Education (CCNE). In the first year, this includes a rigorous sequence of biology, chemistry, microbiology, anatomy & physiology, nutrition, psychology, and sociology courses.

   NUR designated classes are placed early in the program to help students determine if they have the desire and passion to become a nurse. Each course is sequential and helps students begin to navigate the many facets of the nursing profession as well as develop requirements in the essential main core competencies of the professional nurse.

a. What are the expected student-learning outcomes?
   The expected outcomes for the science courses require students to maintain a science/lab GPA of 3.0 or higher. The outcomes for the nursing courses are leveled objectives from the Maine Core Competencies of Nursing profession. All nursing courses have the Maine Core Competencies as learning objectives and they are introduced in the first year. The outcomes for the first year curriculum include maintaining a GPA of 3.0 in science/lab courses and a cumulative GPA of 2.5 is required to progress to second semester nursing courses. The objectives for the nursing courses consist of the Maine Core Competencies of Nursing. These objectives are leveled throughout the nursing curriculum and are introduced in the first year nursing courses.

b. How successful is this curriculum at producing expected outcomes
   NUR data demonstrates that approximately 80-90% of first year nursing students are successful at passing the challenging Anatomy and Physiology, Microbiology and Chemistry
courses with grades sufficient to reach the required science/lab GPA of 3.0 and required Cum GPA of 2.5.

About 97% of first year nursing students are successful in the Nursing (NUR) courses with less than 3% dropping, withdrawing or failing the courses. 80-90% of students are successful at achieving the grades needed in anatomy and physiology, chemistry and microbiology in order to meet the 2.5 GPA requirement within the major. Findings have revealed that approximately 95% of first year nursing students are successful in biology and microbiology, with a small percentage dropped or withdrawn. While 90% of the fall 2018 cohort of nursing students are successful in FSN 100, 10% have failed the course.

4. What are the risks associated with this curriculum?

The Nursing curriculum has some of the highest academic standards at UMaine and is among the most rigorous nursing programs in the state. Students are required to maintain a minimum GPA of 3.0 in all lab/science courses, and a minimum 2.5 in NUR classes in order to progress in the program. The first year is comprised of 15-16 credits per semester with two academically rigorous lab science courses in the fall (BIO 100 and BMB 207/209) and the spring (BIO 208 and BMB 240/241). FSN 100 and PSY 100 are both online courses, which is a challenging learning modality for first year students.

5. In light of risk assessment, what are the alternative first-year curricula?

While the Nursing curriculum is fixed and can’t be significantly modified due to the accreditation requirements described earlier, Nursing is promotes these options to promote student success:

- Encourage some students to drop to 12 credits instead of 15 credits. However due to language of flagship scholarship students and parents are unwilling to accept (or understand) proration of financial aid.
- Encourage students that have AP sciences to repeat sciences at the university to provide more positive outcomes and decrease stress as it relates to success.
- BIO 208 is offered in the summer however many SON students are out-of-state, so this is not an option for most students.

6. What practices, resources, and/or tactics are in place to mitigate risks?

Our faculty employ the following tactics and resources to promote student success in the program. These include:

- Spring 2019, Tutoring program established tutoring for BIO 208 and BMB 240/241.
- Juniors and seniors mentor first year students through OSNA.
- Students that struggled with Lab/Science are encouraged to separate BIO 208 & BMB
240/241; taking BIO 208 in the Fall (3rd) semester. However the SON has been granted only 20 seats and the fall class is taught on-line with statistically lower grades.

- Net Tutoring – begin offered to online classes
- NUR 101 taught by advisor of freshman nursing students

7. **What additional steps can be taken to mitigate risk?**

We believe the following steps can further mitigate risk and promote nursing student success rates.

- Students would benefit if BMB 240/241 and BIO 208 could be taught both spring/fall semesters so that they have the option of taking these courses separately.
- The fall online section of BIO 208 is a good option for students that would benefit delaying taking this course until their second year or if they did not meet requirement and need to repeat. At this time 20 seats are reserved for SON students, however according to the conversations with the department the class average is lower for the online format. With an admission rate of 112-118 students per year, this may not be enough to help with the success of the first year nursing students.
- In addition, it is our recommendation that BIO 208, Anatomy and Physiology be offered as a two-semester course. This course would have two parts which would be sequential (part 1 & part 2).
- We are in discussion with Biochemistry and Biology departments to develop the ideas described above.
- Making students aware of tutoring and peer mentoring resources via the Tutoring Program, Net Tutoring for online courses, and OSNA early and often would be beneficial, as many students aren’t aware of these resources or seek them out when it’s too late in the semester.
- The creation of a Living Learning Community for nursing students that would involve faculty engagement and student organizations such as OSNA.

**Additional Observations**

As mentioned above, due to the heavy workload of two lab science courses in both the fall and spring semesters, we frequently advise students to reduce their credit loads to 12 credits and pick up credits in winter and summer terms. However, the wording of the Flagship scholarship is confusing for students and parents; many fear they will lose their financial aid if they reduce their credit load.
Executive Summary: Social Work

1. Key Findings
   We looked at our first year students for the academic years: 2015, 2016 and 2017. We discovered that one of the challenges for our students is when they take a combination of POS 100 and PSY 100 or either of those classes with SOC 101. We do not have a large number of first year students in our program. Most of our students transfer into our program during their second or third years from within the University of Maine, and from Maine and out-of-state community colleges and universities. Our first-year students do have difficulty reaching the 30 credit goal their first year. There could be many contributing factors such as the transition from high school, financial constraints, mental health challenges (known or just presenting), lack of awareness on how to manage time effectively and lack of strong study habits.

2. Key Components of Plan to Improve Student Success and Timeline for Implementation

The key components of our plan to improve student success are to:

* Pay closer attention when registering first year students not to enroll them in a combination of two or more of the courses in which they have historically struggled (e.g. POS 100, PSY 100 and SOC 101). Our timeline for this will be June 2019.

* Introduce them to their academic advisors earlier in the semester and not wait until registration time to check-in to assess their academic progress. Our timeline for this will be fall 2019.

* To develop a way to provide academic support during the second semester of their first year in small groups facilitated by the BSW Coordinator or the Coordinator’s graduate assistant. Our timeline for this will be the spring of 2020.

* To continue with our academic standing committee which meets monthly to address any concerns regarding students provided by faculty and adjunct faculty. Our timeline for this will be the fall of 2019.

* To encourage students to communicate openly with their professors and to utilize the academic resources on campus. Our timeline for this will be the fall of 2019.

* To develop a mentoring program with 3rd and 4th year students who are willing to volunteer their time and knowledge about our program. Our timeline for this will be the fall of 2019.
## Social Work BSW Program
### Recommended First Year Curriculum

<table>
<thead>
<tr>
<th>1. Fall Semester</th>
<th>Cr.</th>
<th>2. Spring Semester</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>SWK 101</td>
<td>1</td>
<td>SWK 320</td>
<td>3</td>
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<tr>
<td>SOC 101</td>
<td>3</td>
<td>Psy 100</td>
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</tr>
<tr>
<td>Introduction to Sociology</td>
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<td>General Psychology</td>
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</tr>
<tr>
<td>POS 100</td>
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<td>PHI 100, PHI 230, PHI 235, PHI 240, PHI 344</td>
<td>3</td>
</tr>
<tr>
<td>American Government</td>
<td></td>
<td>Contemporary Moral Problems, Ethics, Medical Ethics, Social &amp; Political Philosophy, or Theories of Justice</td>
<td></td>
</tr>
<tr>
<td>ENG 101</td>
<td>3</td>
<td>XXX</td>
<td>3</td>
</tr>
<tr>
<td>College Composition</td>
<td></td>
<td>General Elective</td>
<td></td>
</tr>
<tr>
<td>XXX</td>
<td>3</td>
<td>XX</td>
<td>3</td>
</tr>
<tr>
<td>General Elective</td>
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<td>General Elective Population and Environment</td>
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</tr>
<tr>
<td>XXX</td>
<td>3</td>
<td>GE Artistic and Creative Expression</td>
<td></td>
</tr>
<tr>
<td>XX</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>TOTAL</td>
<td>16</td>
<td>TOTAL</td>
<td>15</td>
</tr>
</tbody>
</table>

### 1. Required First-Year Curriculum
#### a. Courses in the discipline
The only two courses from our discipline are SWK 101, SWK 320. The rest are general education or pre-requisite requirements for our program.

#### b. Gen Ed Courses
SOC 101 is required to be taken before SWK 320 and it meets the requirements for Social Context and Institutions. PHI meets the Gen Ed requirements for Ethics and Western Cultural Tradition. PSY 100 and POS 100 meets the Gen Ed requirements for Social Context and Institutions. ENG 101 meets the Gen Ed requirements for writing competency, however we are only allotted four seats in the Fall semester. The rest of the Gen Eds that we let the students pick meet the requirements for Human Values and Social Context courses.

#### c. Other courses that meet major requirements
None in the first year.
2. **What is the recommended first-year curriculum?**
   See above.

3. **Why is this the required/recommended first-year curriculum?**
   The recommended curriculum is based on the Council on Social Work Education Accreditation standards, specifically, that all baccalaureate social work students must complete a program of study that includes relevant content in the social sciences, humanities, and physical sciences, providing a foundation for acquiring professional knowledge, values, skills, and cognitive and affective processes necessary for beginning generalist social work practice. SOC 101 and POS 100 provide the foundation for the only required social work course (SWK 320 Introduction to Social Work) that students would enroll in during the first year. PSY 100 provides the base for the Human Behavior and the Social Environment courses (SWK 350 and SWK 351) taken in the junior year. All other required social work courses are taught in the junior and senior year.

a. **What are the expected student-learning outcomes?**
   For example: SWK 101, the course objectives are to acquaint students with resources at the University of Maine, to acquaint students with resources at the School of Social Work, to assist students in understanding general education, social work program, and graduation requirements. To assist students in planning and monitoring their course plans as developed with their academic advisor, to acquaint students with volunteer, internship, and career opportunities in social work, to assist students in making the transition to the University of Maine, and to provide a forum for students to discuss and find solutions to issues faced by students entering the social work major.

b. **How successful is this curriculum at producing expected outcomes**
   Most, if not all, meet the requirements with a C- or better in our general education classes. Students need a C or better in SWK 320 to pass the course.

4. **What are the risks associated with this curriculum?**
   Some students have difficulty with classes that involve large lectures and multiple choice exams as the primary assessment measure (e.g. POS 100, SOC 101, PSY 100).

5. **In light of risk assessment, what are the alternative first-year curricula?**
   Students could wait to take POS 100 American Government during their second year of school and replace it with a different general elective.

6. **What practices, resources, and/or tactics are in place to mitigate risks?**
   Practices, resources and resources are identified above.

7. **What additional steps can be taken to mitigate risk?**
   We will discuss our concerns at our monthly faculty meetings, so that everyone is aware of our commitment to provide increased support to our first year students and the expectations we have for advising all of our students. We will make sure every faculty member is aware of the resources available to students and know how to access them. We will check in with students
regarding their academic progress at crucial points in the semester.
Executive Summary

1. Key Findings

Students in our undergraduate program take a core series of wildlife ecology and management courses along with courses in the basic sciences, natural resource management, mathematics, and liberal arts to complete a Bachelor of Science degree in Wildlife Ecology.

Our curriculum is designed to provide students the options of meeting course requirements for certification as a wildlife biologist or fisheries biologist by The Wildlife Society or American Fisheries Society and therefore is informed by those certification requirements. Our review of our required first-year courses shows low-risk for DFWL rates. Student success, as defined as the percentage of our first year students receiving a grade of C or better in our required courses from 2015-2016 through 2017-2018, is at or above 71% with most above 75% (see the curriculum table below for course-specific student success rates). There does not appear to be a difference in retention rates between groups of full-time first-year students who took only Biology, those who took only Math, and those who took both Biology and Math during their first semesters between 2015-2017.

Our first-year curriculum follows best-practices for first year student retention by placing high priority on providing hands-on experiential learning in the discipline, creating strong faculty-student partnerships, and fostering a sense of community through strong student-student, student–graduate student, and student-faculty interactions. Additionally, our first year sequencing in WLE courses is critical to cohort building which results in a sense of integration and belonging, both identified as important factors in student retention (Morrow and Ackermann 2012).

The Department of Wildlife, Fisheries, and Conservation Biology has an active wildlife research program, which exposes students to the cutting edge of wildlife ecology and management and provides many opportunities for undergraduate student employment or experience with wildlife research. These research opportunities are available for first-year students and we have found that students who get involved in research early stay in our program, in keeping with evidence from the literature (Gregerman et al. 1998)

2. Key Components of Plan to Improve Student Success and Timeline for Implementation

1) Request exam scores in BIO 100 and BIO 200 as part of an Early Alert System for student academic success – Fall 2019
2) Evaluate data from the UMaine Office of Institutional Research to identify at-risk populations - current
3) Evaluate the effects of Think30 on first year student retention. Our curriculum includes 14+16 credit semesters which affects student financial aid.
Wildlife Ecology B.S. Program
Recommended First Year Curriculum (with % of first year WLE students receiving a grade of C or better from 2015-2016 through 2017-2018)

<table>
<thead>
<tr>
<th>1. Fall Semester</th>
<th>Cr.</th>
<th>2. Spring Semester</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 100 Basic Biology/Lab (75%)</td>
<td>4</td>
<td>BIO 200 Biology of Organisms/Lab (89%)</td>
<td>4</td>
</tr>
<tr>
<td>ENG 101 College Composition (78%)</td>
<td>3</td>
<td>CMJ 103 Fundamentals of Public Communication (95%)</td>
<td>3</td>
</tr>
<tr>
<td>MAT 116 OR MAT 122 OR Introduction to Calculus Pre-Calculus (71%)</td>
<td>3</td>
<td>ECO 120 Principles of Microeconomics (74%)</td>
<td>3</td>
</tr>
<tr>
<td>WLE 100 Introduction to Wildlife Resources</td>
<td>1</td>
<td>WLE 150 Foundations of Wildlife Management</td>
<td>1</td>
</tr>
<tr>
<td>GENERAL EDUCATION COURSE</td>
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<td>GENERAL EDUCATION COURSE</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>TOTAL</td>
<td>14</td>
</tr>
</tbody>
</table>

1. Required First-Year Curriculum
   a. Courses in the discipline
      WLE 100 and WLE 150 are two core Wildlife Ecology courses that are designed to introduce students to the discipline, maintain contact with faculty, and foster a sense of belonging during the first year.

   b. Gen Ed Courses
      Most of the “non-WLE” courses that students typically take during their first year meet both degree requirements and General Education requirements. These include:

      BIO 100 - Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences
      BIO 200 - Applications of Scientific Knowledge and Laboratory in the Basic or Applied Sciences
      ENG 101 – Writing Competency
      MAT 116 – Quantitative Literacy
      CMJ 103 - Human Values & Social Context (Social Context & Institutions)
      ECO 120 - Human Values & Social Context (Social Context & Institutions)

   c. Other courses that meet major requirements
      All of the courses students take in their first year are required for the WLE major.
2. What is the recommended first-year curriculum?
See the table above for the recommended first-year curriculum. Students have the option of taking a General Education requirement in 1) Western Cultural Traditions, 2) Artistic and Creative Expression, 3) Ethics, or 4) Cultural Diversity and International Perspectives in each semester during their first year. Students in the Honor’s program take an HON course in each of their first two semesters.

3. Why is this the required/recommended first-year curriculum?

a. What are the expected student-learning outcomes?
There are two important sequences during the first year: WLE 100 and WLE 150 as well as BIO 100 and BIO 200. The expected student-learning outcomes for each of these sequences are to provide students with the necessary academic background for success in upper division courses in the Biological Sciences and in Wildlife Ecology. BIO 200 serves as a pre-requisite to three courses recommended during their third semester.

The expected learning outcome for the MAT 116 course is to provide the mathematical foundation for readiness in CHY 121/123 and for WLE 220, both sophomore level courses.

The expected learning outcomes for the WLE sequence is for students to: become familiar with their academic program, expectations, and faculty; develop basic field sampling techniques commonly used in wildlife and fisheries research; become certified through Institutional Animal Care and Use Committee (IACUC) and Responsible Conduct of Research (RCR) trainings; identify common species of plants and animals.

The WLE sequence also serves to build a sense of community and cohort cohesiveness among students as well as help faculty and staff maintain close contact with our first year students.

b. How successful is this curriculum at producing expected outcomes
Based on data from 2015-2018, most of our students receive a “C” or better in required first year courses (see curriculum table above. In the courses considered most challenging for our first year students, most WLE students receive a “C” or better BIO 100 (75%) and BIO 200 (89%). In 2017, we changed our MAT requirement from MAT 122 (71% received a “C” or better) to MAT 116 under guidance from the Department of Mathematics & Statistics and believe our students will benefit from this change.

Based on a 4-year average, first-year retention in WLE is 78% (compared with 80% overall in the college and 76% overall at UMaine).

4. What are the risks associated with this curriculum?
The risks associated with our curriculum are that some students perform poorly in BIO 100, BIO 200, and MAT 116. A grade of C- or better is required in BIO 100 and BIO 200 to advance to upper level courses, and some students need to retake these courses. Students typically are successful in the other recommended (all required for the major) courses.
5. **In light of risk assessment, what are the alternative first-year curricula?**

We believe there is no alternative first year curricula for students to maintain progress in the program. BIO 100 and BIO 200 are required pre-requisites for all upper division Biology courses and our own WLE 200, itself a pre-requisite for all upper division Wildlife Ecology courses.

6. **What practices, resources, and/or tactics are in place to mitigate risks?**

Historically, we received access to exam scores in BIO 100 and BIO 200 so that we could track the progress of our students but that practice no longer exists.

That said, students have access to TRIO, the Tutor Program, the Math Lab, and Writing Center. Some of our students live in Living Learning Communities so have peers locally to study with.

In WLE 100, students are reminded that their academic progress in our program is based on their performance in BIO 100 and BIO 200 so are encouraged regularly to seek help if their performance on their first exam is poor.

7. **What additional steps can be taken to mitigate risk?**

In terms of the risk of poor performance in BIO 100 and BIO 200, we believe an early alert system, as was used historically based on grades collected in Synapse would help mitigate risks.

In WLE, we already have a major-specific cohort building sequence of courses where the instructor routinely “checks in” with students about their progress and challenges and works to arrange study groups and provides students with guidance about resources available on campus to support their positive progress towards their degree.

**Literature Cited:**


The Academic Improvement Program (AIP) in the College of Natural Sciences, Forestry, and Agriculture (NSFA) was created in response to college undergraduate program coordinators suggesting that an increasing number of students seemed to have inadequate academic preparation. They reported that many students did not know how to study, lacked time management skills, and did not wish to engage in course-related activities. This lack of preparedness was thought to contribute to poor academic performance. In an effort to help these students, the college’s Associate Dean of Instruction’s office investigated models designed to help students and then created the Academic Improvement Program (AIP). The program was designed to:

1. help students improve their study habits
2. help students improve their time management skills
3. require students to engage and discuss their academics with a student mentor
4. make students aware of existing academic resources, and
5. improve the college’s ability to identify which students are making a real effort to succeed.

The core of the AIP program is a weekly meeting between the student and a student mentor. The student mentor approach was selected since a limited review of literature suggests that student mentors can be effective in helping other students improve their academic performance, and, creating such a program would be relatively easy and inexpensive to develop. Students may find this method effective since they are generally the student’s peers, and our mentors already successfully passed most of the challenging courses the students are likely to struggle with (e.g. biology, chemistry, mathematics). Mentors were carefully selected and then trained on mentoring basics like how to keep confidentiality and what resources are available on campus.

The program begins with an orientation where students provide information on: where they normally study, how they study, how many hours they work per week, what type of calendar they use, and what problems they feel are currently barriers to their success. The mentors have materials with study tips and campus resources. All meetings between the student and the student mentor are held in the associate dean’s main office. The meetings take place at a desk that is partially secluded, but within sight and earshot of office staff.

During these weekly meetings, the student mentor completes a form detailing the student’s response to various questions including how things are going, what grades the student has received, and if the student is having particular problems. Depending on the answers, a student may be encouraged to visit a resource center such as the Math and Statistics lab or Student Accessibility Services. The student mentor also collects information about homework, exam and quiz scores. There are several “red-flags” that may compel the student mentors to involve the Associate Dean or other staff. Students with personal problems are directed to staff and students who miss multiple meetings or are generally not engaging in the meetings, receive a note from the Associate Dean to visit for a discussion.
Following a small pilot program, the first official AIP program cohort was selected for the Spring of 2016. The criteria for selection included (1) a Fall 2015 GPA between 1.1 and 2.0 GPA, (2) being true first-year students in Fall 2015, and (3) finishing the following semester. The GPA criteria were set so as to arrive at a manageable cohort size. Students with GPA below the 1.1 were directed to a different campus-wide remedial program. The AIP program was designed for true first-year students since anecdotal evidence suggested that new students were more amenable to change than habitual poor performing upper class students, who as a group, seemed more set in their ways. A total of 37 met the above criteria forming our Spring 2016 AIP cohort.

**Data and Analysis**

While it was expected that the AIP program would improve grades and retention, a control group was sought for comparison since student GPA tends to rise over time. Upon consideration, it was decided to select students from the previous year (Fall 2014 entering) to use as a control group. While we could not ensure that both the AIP (Fall 2015 entering) and control cohort (Fall 2014 entering) had the exact same first fall semester courses, no major changes to typical first year course schedules were known. A further consideration was the academic aptitude as measure by the SAT scores for the Fall 2014 entering students (control cohort) versus the Fall 2015 entering students (AIP cohort). For the College, the math SAT score has been found to be the best predictor of a student’s success in their first semester courses. In comparing 2014 and 2015 entering first-year students, the mean math SAT score equaled 544 for the Fall 2014 class, and 548 for the Fall 2015 entering class. The four point difference was noted, but considered close enough to be an insignificant factor when comparing the cohort first fall GPA.

In reviewing the Fall 2014 entering students, we found 49 students met our criteria for being a control cohort. These students were true first-year students, ended the fall semester with a GPA between 1.1 and 2.0, and completed the following semester.

The students in the AIP program, were tracked from their first semester (Fall 2015) to Fall 2017. At this writing the Fall 2017 grades are not known, but we know if the students are enrolled or not, allowing for observation of retention. Table 1 shows the AIP and control cohorts across different semesters. For each cohort the semesters run 1 to 5. Both cohorts have four semesters of GPA data and five semesters of retention data. Since measuring student retention is comparing student enrollment to a base measure, we lose two observations since our base semesters is semester 2, the semester of the AIP program.

<table>
<thead>
<tr>
<th>Semester</th>
<th>F14</th>
<th>S15</th>
<th>F15 (AIP)</th>
<th>S16</th>
<th>F16</th>
<th>S17</th>
<th>F17</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIP cohort GPA data</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>AIP cohort retention data</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Control cohort GPA data</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control cohort retention data</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
While Table 1 is formatted by calendar semester, Table 2 is formatted by semesters completed. The Table 2 alignment allows for direct comparisons of the two cohorts as they move through their first and subsequent semesters. For example semester 1 for both cohorts is their first semester of college. As shown, both cohorts have low GPA averages in semester 1. This was expected since these groups were selected among students with first semester GPAs between 1.1 and 2.0. Semester 2 is the second semester for both cohorts, where the AIP cohort has the AIP program and the control cohort does not. The GPA for the AIP cohort is greater than the control cohort GPA for semesters 2, 3 and 4, although the difference narrows.

For comparing retention across the two cohorts we use the number of students who complete semester 2 with grades as the base enrollment value. For the AIP cohort 37 students completed semester 2, and for the control cohort 49 students completed semester 2. For the 37 AIP cohort students who completed semester 2, 29 continued and completed semester 3. The remaining eight students where either suspended between semesters or officially withdrew from UMaine at some point before the end of semester 3.

For the 49 AIP cohort students who semester 2, 36 continued and completed semester 3. The remaining 13 students where either suspended between semesters or officially withdrew from UMaine at some point before the end of semester 3. Thus the first observation of retention is the number of students who completed semester 2 and continued into semester 3. This is shown in Table 2 in the rows “AIP cohort retained” and “Control cohort retained” under the semester 3 column, where the retention is 29 of 37 and 36 of 49, respectively.

In Table 2 under semester 4 we see 28 of the original 37 AIP cohort finished semester 3 and began semester 4, while for the control cohort 31 of the original 49 students finished semester 3 and began semester 4. Under semester 5 we see 28 of the original 37 AIP cohort finished semester 4 and began semester 5, while for the control cohort 28 of the original 49 students finished semester 4 and began semester 5. Table 2 also shows retention as a percent of the base number of students who started and finished semester 2.

Table 2. GPA and retention data for AIP and control cohorts.

<table>
<thead>
<tr>
<th>Semester Comparisons</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Semester GPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIP cohort GPA</td>
<td>1.618</td>
<td>2.749</td>
<td>2.707</td>
<td>2.557</td>
<td></td>
</tr>
<tr>
<td>Control cohort GPA</td>
<td>1.691</td>
<td>2.365</td>
<td>2.333</td>
<td>2.432</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of Students Retained</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIP cohort retained</td>
<td>29 of 37</td>
<td>28 of 37</td>
<td>28 of 37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control cohort retained</td>
<td>36 of 49</td>
<td>31 of 49</td>
<td>28 of 49</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percent of Student Retained</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIP retention</td>
<td>78.34%</td>
<td>75.68%</td>
<td>75.68%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control retention</td>
<td>73.47%</td>
<td>63.27%</td>
<td>57.14%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1 shows the average semester GPA for the two cohorts. The first semester GPA averages are close to one another as expected since (a) the semester 1 is before the AIP program thus precluding any AIP impact for that semester, and (b) the cohort populations are designed to be as
similar as possible. In moving from semester 1 to semester 2, both cohorts increased their average GPA, with the AIP cohort GPA being higher. In semesters 3 and 4 the AIP cohort continues to have semester GPAs above the control cohort, but the difference narrows. To help assess the impact of the AIP program, the average GPA values and compared using the t-test with equal and unequal means. In no case did the assumption of mean equivalence change the results so only differences in the means will be discussed.

In comparing the semester 1 GPA values, the average GPA for the two cohorts are not statistically different. This result was expected as this semester precedes the AIP program and the two populations have the same characteristics.

For semester 2 the AIP cohort has an average GPA of 2.749 while the control average GPA is 2.365. The AIP average was found to be significantly greater than the control cohort GPA (at the 95% level). Similarly, the semester 3 cohort GPA values, 2.707 for the AIP cohort and 2.333 for the control cohort, was found to be statistically different (95%). These statistical results supports our hypothesis that the AIP program imparts some academic improvement skills with some lasting effect.

While the AIP cohort GPA is still higher than the control cohort in semester 4 (2.557 versus 2.432), the difference narrows. The AIP cohort’s GPA has declined while the control cohort GPA has risen. Statistically, there is no difference between these average scores.
In addition to expecting the AIP program to improve student GPA, we also expect the program to increase our retention rate of these students. Since retention is considered after the AIP program, we compare students completing semesters, 3, 4 and 5 compared to those completing semester 2. Figure 2 shows the retention percentage for the two cohorts with the AIP retention rate being considerably higher. At this time further analysis is being conducted on the retention data including retention within the college versus retention of those who transferred to other colleges at UMaine.

### Discussion

The AIP cohort achieves better average GPA and retention data. The GPA improvement is statistically significant for the semester of the AIP program and the semester immediately following. While the AIP cohort has considerably higher retention data, the statistical analysis is ongoing.

As shown in the Figure 1, the highest GPA for either cohort for any semester is the AIP cohort during the AIP program (GPA average of 2.749). Given the anticipated benefits of the weekly check-in meeting, this result was expected. However, the gentle decline in the AIP average GPA in the two semesters beyond the program was not expected. Upon reflection there are several possible contributing factors including students being somewhat less vigilant with respect to time.
management and other practices (without their mentor), as well as students moving into more challenging coursework.

We find it interesting that the two GPA averages are converging. While this is a topic for further analysis including additional data, it begs the question – are both cohorts converging to what might be considered “normal students”?

**Caveats**

While we feel the control cohort is a good comparison group, there was one difference for which we could not control. It is customary in the college to place students with less than a 2.0 GPA on academic probation, and sometimes this will include an academic contract. The academic contract states that students cannot have student conduct violations, no unexcused classes, earn a GPA of 2.3 or higher, and must contact the Associate Dean’s office should any problems arise. The contract states that failure to do so can result in suspension from UMaine. Beginning with the AIP cohort (Fall 2015), all students in the AIP group were placed on a one semester contract and were required to attend the AIP program as part of the contract’s conditions. For the control cohort only 10 of the 49 student were place on an academic contract, as opposed to all students in the AIP cohort being under the contract.

Our intuition tells us that the combination of a contract that essentially states “make acceptable grades or you'll be suspended,” coupled with weekly meetings with a mentor, has a powerful influence on the first year students. So the comparison between the AIP and control cohort is “academic contract plus AIP program” versus “no students in the AIP program and roughly 20% on contract”.

Regarding effectiveness of putting upper-level students (juniors/seniors) on the AIP program, our experience with a small number of students show the impact being not as great as with the first year students. We conclude that upper-level students are more “set in their ways” than the first year students. Thus we have chosen to focus the AIP program on first year students since we (a) have limited resources, (b) the impact appears to be smaller with upper class students, and (c) we long-term weekly meetings runs counter to college being an endeavor where students must eventually become self-motivated and take charge of their affairs. Thus while occasional exceptions are made, the AIP program is a one-time opportunity for students.

An additional note concerns the comparability of the retention rate, particularly in moving from semester 2 to semester 3. One purpose of the AIP program is to help determine which of the students who struggled their first semester, are truly putting in a serious academic effort in their second semester. Experience shows that the weekly meeting provides a highly reliable sense as to whether a student is putting forth in a significant academic effort. For the control group, academic suspensions accounted for 3 of the 13 semester 2 to 3 loss in student numbers (23.08%), while for the AIP cohort, academic suspensions accounted for 3 of 8 semester 2 to 3 loss in student numbers (37.50). This may be one reason the retention rate is closer for the two cohorts in moving from semester 2 to 3 – more of the AIP cohort was suspended given the associate dean’s knowledge of AIP student engagement.
Student comments

While the academic literature and the data from this study support the opinion that a student mentor program can be beneficial, we thought including some student comments would add some context. On post-AIP program questionnaires, a typical response to the question, “What skills did you learn?” included:

- Organization and time management skills. The meeting each week allowed me to develop skills on being where I needed to be and on time.
- I learned to be more organized and to plan ahead better.
- Keeping track of what I have to do and what I have done.
- Time Management.
- I learned how to plan my week out so that I don't have to stress later on.
- I developed a better work ethic.
- Using planners and thinking more about how I manage my time.

In response to the question, “What did you like about the program?” students responded:

- I liked that each week our mentor asked us about our homework/quizzes/tests we had.
- The program allowed me to outline my week and make sure I was well organized.
- I liked that I always knew there was someone there to answer questions.
- I felt very comfortable talking about what I needed to and getting help.
- Everyone was very kind and helpful when needed.
- That the meetings were informal, effective, and short.
Appendix supplemental graph. First year student grades, with/without Academic Improve Program – plus two semesters. Left graph is control group – FY student with first semester GPA between 1.1 and 2.0, and no AIP. Control group first semester F14. Right graph is AIP treatment group – FY students with first semester GPA between 1.1 and 2.0, with AIP.

On average, students who remain in school improve their grades from their first to second semester. However, note that with the Academic Improvement Program, there is less dispersion (the grade improvement is more uniform). While less pronounced, the smaller variance continues for the following two semesters.