Division of Natural Sciences and Mathematics

Marine Science Program Evaluation

August 2011

**Submitted by:**

**Frankie Lynn Harriss, Brian Lynch, and Allain Bourgoin**

Division of Natural Sciences and Mathematics

College of Micronesia-FSM

1. **Program Goals:**

The student will be able to:

1. Demonstrate fundamental knowledge of geological, geographical, physical, chemical, astrological, and biological oceanography.
2. Apply fundamental knowledge of marine sciences towards identifying and solving regional and global problems relating to marine systems.
3. Apply the scientific process to formulate hypotheses, design experiments, and collect and analyze data from which valid scientific conclusions are drawn.
4. Communicate effectively, in written and oral forms, utilizing the language and concepts of marine science.
5. **Program History**

In 1986, the Marine Science Program was implemented and the first class graduated in 1989. The program began rather experimentally as a means to train students for pursuit of a higher degree in marine science and to prepare individuals for local positions, and today this remains a program focus. Initially, the program experienced recruitment difficulties and had merely six students enrolled. Today, the program has grown to 54 majors and attracts high quality students. Recruitment efforts over the years have improved, and our program serves as a gateway to many internship and scholarship opportunities for those who excel in the program. Further, in recent years, our students have been highly competitive against Pacific students for scholarship and internship positions across the region.

This year, program learning outcomes were altered in an effort to make them a more accurate reflection of expectations, and more importantly, to ensure the outcomes were measureable. The prerequisites were changed for MR 201 Aquaculture and MR 210 Marine Ecology to ensure students had more complete background knowledge for success in each of these courses. Further, developed and approved were new course outlines for MR 120 Marine Biology and MR 201 Aquaculture. These outlines were done to ensure all course learning and student learning outcomes were measurable and that we had specific strategies in place for the purpose of assessing student learning outcomes. Our division also designed and had approved ESS 102WS/1 Open Water SCUBA Diver as an official course, with the primary goal of offering this training to our marine science majors, as many positions and research efforts require methods of underwater investigation to be utilized. This course will not be required, but would be highly recommended to our majors in order to also satisfy their exercise sports science 1 credit hour graduation requirement. Finally, we have had to increase the number of sections and class size of MR 120 Marine Biology and MR 240 Oceanography in order to meet both increasing numbers of marine science majors and of other majors who must satisfy their science with lab requirement for graduation.

1. **Program Description**

The Marine Science Program is designed to respond to a need expressed by the FSM leadership in the FSM States and National Economic Summits. It has been designed to take full advantage of the unique variety of marine environments available in the FSM, particularly Pohnpei. This program provides a solid foundation for students interested in pursuing a higher degree at a four-year institution.

The Marine Science program falls under the Division of Natural Sciences and Mathematics and is headed by a program coordinator who is also one of the marine science instructors. Currently, three full-time faculty are responsible for program-specific course instruction, though each also teaches a few courses outside the marine program each year. The program offers only an Associate of Science Degree in Marine Science. Students of other majors also regularly take some of our marine science courses, in an effort to meet their science with a lab and science without a lab, graduation requirements. Typically, the most heavily utilized marine courses taken by non-majors are MR 120 Marine Biology and MR 240 Oceanography.

1. **Program Admission Requirements**

Students who are accepted for admissions to COM-FSM are eligible for the Marine Science Program, though all of our courses require students to demonstrate a proficient reading level either by scoring high enough on their entrance test or by completing additional studies and successfully passing ESL 089

1. **Program Degree Requirements**

The Marine Science AS degree has General Education Core Requirements in English (9 credits), Mathematics (3 credits), Natural sciences (7 credits), Social Sciences (3 credits), Computer Applications (3 credits), Exercise Sports Science (1 credit), and Humanities (3 credits) for a total of 29 credits. Additionally, students must complete 36 credits in marine major requirements by completing marine biology (4 credits), aquaculture (4 credits), marine ecology (3 credits), ichthyology (4 credits), oceanography (4 credits), fisher biology and management (3 credits), marine biology field studies (1 credit), chemistry (4 credits), social science (3 credits), and an open elective (3 credits) such that the total degree credits is sixty-five.

1. **Program Courses and Enrollment**

The following are descriptions of the General Education Core courses and the major courses required for the AS in Marine Science:

**EN 110 Advanced Reading:** Designed to improve students’ critical reading and thinking skills, increase analytical, inferential and evaluative comprehension, expand vocabulary skills, and employ effective study strategies for use across academic disciplines.

**EN 120a Expository Writing I:** Designed to help students develop in expository writing by completing a minimum of five multi-draft essays of varying degrees of complexity. In these essays students develop topics in at least four of these five rhetorical patterns: example, comparison/contrast, classification, process analysis, and cause/ effect analysis. The students also write an argumentative essay that demonstrates familiarization with methods of research documentation.

**EN 120b Expository Writing II:** Provides an introduction to college-level research writing skill.. the student will investigate research topics in a variety of disciplines while enhancing their critical thinking and argumentative abilities.

**MS 100 [or above] College Algebra:** Identifies components of exponential expressions in polynomials with mathematical operations of exponential expressions; factoring of up to 4th degree polynomials; recognizing rational and irrational numbers with emphasis on the use of number lines, equation and inequality solving with application problems; introduction of literal equations; working with radical expressions; graphing of two variables on the xy plane; solving systems of equations in two or three variables;

For 7 credits any combination of science w/lab and a science without a lab:

Science Course with Laboratory:

Options include:

**AG 101 Introduction to Agriculture**

**AG 110 Crop Production w/Lab:**

**AG 140 Principles of Animal Science w/Lab**

**SC 117 Tropical Pacific Island Environment w/Lab**

**SC 120 Biology w/Lab**

**SC 122a** **Anatomy and Physiology I w/Lab**

**SC112b Anatomy and Physiology II w/Lab**

**SC 130 Physical Science w/Lab**

**SC 180 Microbiology w/Lab**

**SC 230 Introduction to Chemistry w/Lab**

**SC 240 Introduction to Physics w/Lab**.

**SC 250 General Botany w/Lab**

**SC 255 General Zoology w/Lab**

Non-lab science courses:

Options include:

**SC 111 Environmental Science**

**SC 115 Ethnobotany**

**SC 220 Introduction to Geology**

**SC 260 Independent Studies in Biology**

**SS 150 History of Micronesia:** Study of Micronesian History from Pre-history to the present.

**CA 100 Computer Literacy:** Introduction to computer concepts and applications

Exercise Sport Science Course

Options Include:

**ESS 101 Individual activities**

**ESS 101j Joggling**

**ESS 101r Resistance Training**

**ESS 101t Introduction to Tai Chi/Qi Gong**

**ESS 101w Walking for Health and Fitness**

**ESS 101y Introduction to Yoga**

**ESS 102(x) Group Team Activity**

**ESS 102b Fundamentals of Basketball**

**ESS 102s Fundamentals of Softball**

**ESS 102v Introduction to Volleyball**

**ESS 102 Snorkeling**

**ESS 102WS/1 Open Water SCUBA Diver**

Humanities Courses

Options include:

**Ethical Thought and Moral Values:**

**EN 208 Philosophy**

**EN 209 Introduction to Religion**

**Language:**

**FL 101 Japanese I**

**FL 102 Japanese II**

**ML10 Micronesian Language**

**FL/SS 107 Chinese Language and Culture**

**Arts:**

**AR 101Introduction to Art**

**AR 105 Painting**

**EN 213 Island Style Theater**

**MM 110 Introduction to Photography and Video**

**MM 120 Film Studies**

**MM 205 Media Studies**

**MM 240 Computer Animation**

**MU 101 Introduction to Music**

**SS 195 Micronesian Cultural Study**

**Historical Analysis:**

**EN 210 Writing on 19th Century Pohnpei**

**SS 170 World History I**

**SS 171 World History II**

**SS 240 East Asian History**

**Literature:**

**EN 210 Introduction to Literature**

**EN 202 Narrative Fiction**

**EN 203 Drama**

**EN 204 Poetry**

**EN 205 Literature of the Sea**

**EN 206 Mythology**

**MS 150 Statistics**

**MR 120 Marine Biology w/lab**: The course introduces students to the common forms of life inhabiting the oceans of the globe including the marine microbes, plants, invertebrates, and vertebrates. Their basic structure, function, natural history and adaptations to the marine environment will be covered. Current issues in marine biology will also be discussed. Laboratory sessions and field exercises will focus mostly on the taxonomic groups.

**MR 201 Aquaculture w/lab**: An investigation of the principles underlying the culture of both marine and freshwater organisms. Pertinent aspects of the physiology of aquatic species will be covered as well as system design, water quality, nutrition, reproduction, and disease. An analysis of the constraints of the development of aquaculture will be made.

**MR 210 Marine Ecology w/lab**: Focuses on principles of ecology, ecological terminology, and the ecology of marine ecosystems. Important physical, chemical, and biological interactions controlling coral reef, mangrove, seagrass, estuarine, pelagic, benthic and upwelling communities are discussed.

**MR 230 Ichthyology w/lab**: Focuses on the general aspects of fish biology including tropical, temperate, freshwater and marine fishes. Topics include classification, biology, and physiology of fish. The laboratory includes internal and external examinations, identification, and field observation techniques.

**MR 240 Oceanography w/lab**: The course will include sections on oceanographic history, geology, chemistry, physics, biology, technology, and careers. The use of terminology will be emphasized. Laboratory and field exercises will include demonstration of basic concepts; use of instrumentation; and the collection and presentation of oceanographic data.

**MR 250 Fishery Biology and Management**: The biological aspects of fisher science that are used in management are examined. Population dynamics, modeling, fishing techniques, economics, reproduction, production, ecology, geography, oceanography and important environmental factors are discussed. Individual fisheries are used as examples of important concepts.

**MR 254 Marine Biology Field Studies**: Reinforces an understanding of marine biology, the marine environment and marine organisms through exposure to learning experiences in the field and laboratory investigations.

**Program Enrollment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Title** | **Overall Enrollment** | | | |
| Fall 2010 | | Spring 2011 | Summer 2011 |
| MR 120 | 29 | | 32 | 18 |
| MR 201 | Not offered | | 16 | Not offered |
| MR 210 | Not offered | | 18 | Not offered |
| MR 230 | 19 | | Not offered | Not offered |
| MR 240 | Not offered | | 31 | 13 |
| MR 250 | Not offered | | 15 | Not offered |
| MR 254 | 14 | | 7 | Not offered |
| SC 260 | Not offered | | Not offered | 7 |
| **Totals** | **62** | | **119** | **38** |
| **Academic Year total** | | **219** | | |

Previously, there were more marine courses running in the spring semester compared to the fall semester. In the past, this was not an issue, as the total number of marine science majors was lower; however, due to the increasing enrollment for the Marine Science Program, we scheduled MR 240 Oceanography to be offered for both the fall and the spring semesters next year to help ensure we better meet student needs. Further consideration for the spring semester schedule will have to occur, as we realize that many of the students end up taking 3 – 4 science courses together in their second semester; consequently, we may be putting them at higher risk of failing or scoring low in one or more of those courses, as the study time required for success would be extremely high.

In general, enrollment within the marine science classes is pretty high. In courses such as MR 120 (Marine Biology) and MR 240 (Oceanography), the roster fills quickly and no seats are available at the start of each semester. This number varies depending on whether 1 or 2 labs are offered, but there are always 20-30 students per lecture. For the more advanced Marine Science classes (those requiring a marine prerequisite), the number of students typically tops out around 18 students, almost exclusively Marine Science with a few Education majors that need an additional science class and have met the required prerequisite. The only exceptions to this include the MR 254 Field Study class and SC 260 (Independent Study in Biol.) as these are more hands on and field oriented requiring a more intimate level of contact between students and the instructor.

Much of the success of the program in recent years (in regards to recruitment, graduation, and transfer of our students) must be attributed to several grants and an increased collaborative relationship with University of Hawaii faculty. These consortium grants have allowed us more control over our program by providing additional sources of funding above/beyond what could ordinarily happen to support a program from a division budget that must support a number of different classes across many disciplines and many majors. Our regular division budget does not allow for luxury purchases such as student stipends for internships and research projects, money for student and or faculty travel to conferences or workshops, expensive equipment, and covering the costs associated with certifying students for SCUBA. With the financial support offered by these grants, we have been able to recruit better, offer our students bigger/better learning opportunities while they are enrolled in COM-FSM, and also assist in their finding transfer options post graduation. In short, these grants and the established contacts we now have at UH have given us a legitimacy that was previously lacking, helping to cover some of the holes that exist as a small college isolated on a remote Pacific island.

1. **Program Faculty**

Currently, three full-time faculty teach for the marine science program and also teach other courses for the Division of Natural Sciences and Mathematics. Each instructor has varied backgrounds and experiences within the marine sciences, and each is utilized to teach courses most reflective of those backgrounds. Additionally, the faculty serve as advisors to marine science majors and participate in both college and community services.

1. **Program Outcome Analysis: Health Indicators**

1,2) With 54 students enrolled in the Marine Science Program and 9 student graduates this year, we are currently showing a graduation rate of about 17% and are expecting that percentage to increase this next year as our program enrollment has increased (waiting for IRPO data on exact increase in program enrollment over the last decade). The number of females enrolling in the Marine Science Program is steadily increasing--previously the program was primarily composed only of male students.

|  |  |  |  |
| --- | --- | --- | --- |
| **Campus** | Total number of Marine Science Program majors | Females | Males |
| National | 54 | 12 | 35 |
| Pohnpei State | 2 | 1 | 1 |
| Kosrae | 5 | 4 | 1 |

1. Average Class Size

As indicated earlier, our class sizes are at or close to maximum depending on the course and the number of labs available. Using the same table from the section on Program Enrollment (f), we can review enrollment by class. Both Marine Biology and Oceanography average 16 students per lab section (some semester we run two labs per one lecture, others just one). Our upper level marine science classes run very close to this same level indicating most of our classes are running at or very close to maximum capacity.

1. Cost Per Seat for students in Fall 2010 – Summer 2011

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Classes** | **Credits** | **CPC** | **Lab fee** | **Cost Per Seat** |
| CA 100 | 3 | $105.00 |  | $315.00 |
| EN 110 | 3 | $105.00 |  | $315.00 |
| EN 120a | 3 | $105.00 |  | $315.00 |
| EN 120b | 3 | $105.00 |  | $315.00 |
| MS 100 | 3 | $105.00 |  | $315.00 |
| SS 150 | 3 | $105.00 |  | $315.00 |
| Science w/lab | 4 | $105.00 | $25.00 | $445.00 |
| Science, non-lab | 3 | $105.00 |  | $315.00 |
| Humanities | 3 | $105.00 |  | $315.00 |
| ESS | 1 | $105. 00 | *\*$100.00* | $105.00 |
| Open elective | 3 | $105.00 |  | $315.00 |
| MR 120 | 4 | $105.00 | $25.00 | $445.00 |
| MR 201 | 4 | $105.00 | $25.00 | $445.00 |
| MR 210 | 3 | $105.00 |  | $315.00 |
| MR 230 | 4 | $105.00 | $25.00 | $445.00 |
| MR 240 | 4 | $105.00 | $25.00 | $445.00 |
| MR 250 | 3 | $105.00 |  | $315.00 |
| MR 254 | 1 | $105.00 |  | $105.00 |
| Social Science | 3 | $105.00 |  | $315.00 |
| MS 150 | 3 | $105.00 |  | $315.00 |
| SC 230 | 4 | $105.00 | $25.00 | $445.00 |
| **Totals** | 65 |  | **$150.00** | **$6975.00** |
| **Total Program Cost Per Seat** | | | **$7,125.00** (with ESS 102/WS1 $7225.00) | |

\* If students elect to take ESS 102/WS1 there is a $100.00 fee

1. Course Completion rate in Fall 2010 – Summer 2011

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Course Completion Rate for Fall 2010 – Summer 2011 | | | | |
| Course | Enrolled | Passed | Failed | Completion Rate |
| MR 120 | 79 | 64 | 13 | 83% |
| MR 201 | 16 | 15 | 1 | 94% |
| MR 210 | 18 | 17 | 1 | 94% |
| MR 230 | 19 | 17 | 2 | 89% |
| MR 240 | 44 | 29 | 10 | 74% |
| MR 250 | 15 | 11 | 4 | 73% |
| MR 254 | 21 | 15 | 5 | 75% |
| SC 260 | 7 |  |  | Can’t yet calculate |
| **Totals** | **219** | **168** | **36** | **82%** |

\*note there is one incomplete in MR 254, eight incompletes in SC 260, and other differences shown are due to withdraws. Withdraws and incompletes were not factored into completion rates.

1. Student Satisfaction.

We are not clear whether IRPO has data from student satisfaction surveys? We did conduct a small exit survey on our four students who graduated this spring.

MARINE SCIENCE A.S. DEGREE PROGRAM EXIT SURVEY

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Strongly disagree** | **Disagree** | **Neither agree nor disagree** | **Agree** | **Strongly Agree** |
| 1. Instructors in your marine science courses demonstrated knowledge of content |  |  |  | **1** | **3** |
| 2. Instructors in your marine science courses seemed to sincerely care about you and your progress in your classes. |  |  |  |  | **4** |
| 3. Classroom atmosphere in your marine classes seemed comfortable and supportive. |  |  |  | **2** | **2** |
| 4. Your grades in marine science courses were an accurate assessment of your performance and mastery of subjects. |  |  |  | **1** | **3** |
| 5. You marine science program advisor was available to assist you when needed. |  |  |  | **2** | **2** |
| 6. Your marine science program advisor seemed to care about you and helped you to meet your academic goals. |  |  |  | **1** | **3** |
| 7. Your marine science program advisor helped you select courses that ensured you met graduation requirements. |  |  |  |  | **4** |
| 8. Your marine science program advisor assisted you with continued educational and career planning. |  |  |  | **2** | **2** |
| 9. You feel confident with the skills you acquired in the Marine Science AS degree program for successful transfer to a 4-year college/university. |  |  |  | **3** | **1** |
| 10. You feel confident with the skills you acquired in the Marines Science AS degree program to successfully obtain and maintain a job in this field. |  |  |  | **1** | **3** |
| 11. You feel that you increased your ability to design and conduct field studies in marine science. |  |  |  | **1** | **3** |
| 12. You feel the Marine Science AS degree program offered enough opportunities for scholarships and internships compared to other degree programs. |  |  |  | **2** | **2** |
| 13. You felt your experience in marine sciences courses was enjoyable. |  |  | **1** |  | **3** |
| 14. You feel that equipment for labs and equipment for field studies was adequate. |  |  |  | **2** | **2** |
| 15. You feel that you received a broad and adequate introduction to the marine sciences after completing this program. |  |  |  | **3** | **1** |
| 16. What are your plans, now that you are graduating?  a. Transferring to a 4-year college/university\_\_\_\_\_ (please provide the name of the college or university to which you are transferring.  b. Perhaps Transferring later, but not now.  c. Looking for a job in the field.  d. Have a job in the field working for\_\_\_\_\_\_ (please list your new employer) | \*One student listed transfer to UH.  \*One student listed transfer to UH Hilo.  \*One student listed transfer to UOG.  \*The remaining student selected item b, looking to transfer later, but not now. | | | | |
| 17. Please describe a few of your best and/or favorite experiences during your studies in the marine science program | * “Well, I have a few best experiences that involves going out in the field, which kind of help me to get to know better the marine environments and I kind of like the intern cause its fun and helps me more. * “Building up aquariums in class and having field studies.” * “Marine science program has introduced me the basic knowledge/research that based on life of the marine environments.” * “I had experienced lots of things in this program like, diving, taking photos or shooting video clips underwater snorkeling, fixing an aquarium and try to make sure the organisms inside is not stress.” | | | | |
| 18. Please describe a few of your worst and/or least favorite experiences during your studies in the marine science program. | * “It seems that there isn’t any that I would think of, I can only say that my experiences in all my classes are good except that I don not enjoy staying in the classrooms when I could hardly” * “Doing lab report in oceanography.” * “I would just say that there’s no worst experience in marine science program as I was taking the courses. Marine science program is interesting.” * “I think there’s no worst or least favorite experiences I had in this program because I enjoyed doing what we did in the program.” | | | | |
| 19. Please describe experiences you had hoped to have during your studies in the marine science program that did not happen. | * “I should say going diving.” * “Studying sediments from the deep bottom water. Diving and studying deep water.” * “Everything that I expected to learn was there in Marine Science Program.” * “I did not hoped to meet experiences on my own, but I would like the program to be more challenging.” | | | | |
| 20. Please describe any improvements you feel could be made to the marine science program to make it a better experience for future students. | * “There isn’t really anything, I would recommend just work together, be helpful. And make these tests easy.” * “Need more lab equipments so students can use in their labs.” * “The COM-FSM needs more instructors for the Marine Science courses.” * “Make the program more interesting by doing a lot of hand-on activities or go in the field not only in classrooms. | | | | |
| 21. Please feel free to make any other comments you would like about the marine science program positive and/or negative. | * “The marine science program is good in that it helps prepar students before doing to a higher level of education, it’s fun because you always go picnic.” * “Positive: need to keep the same teaching lesson, or improve more, need more equipments, need to dive to study underwater.” * “No comments!!!” * “No comment – keep up the good work!!!” | | | | |

1. Employment data:

Past graduates have not been completely tracked for employment data. This is an area where we have been weak, and we must improve. It is clear that the IRPO office will not undertake this task immediately, and is likely a bit overwhelming for those working with general alumni data. This responsibility will have to fall to our division and program coordinator, and we are hoping that improving communications will allow us to better stay in touch with our graduates. An employer satisfaction survey would also be ideal.

Three of our graduates from the previous academic year currently are, and have been, employed for this past year, at the Nett Hatchery working in the field of aquaculture. Their employer has offered positive feedback and is generally very pleased with the graduates’ skill level and competency. Additionally, we know of others that are working in their field with various agencies relating to the environmental sector, but a standardized tool or tracking instrument to be used across all programs at COM-FSM would be preferred over just anecdotal data.

1. Transfer data:

Again, we have been remiss in collecting these data and are now beginning to try to track our graduates who have transferred. Currently, to our knowledge we have 1 student at University of Guam and 4 students attending the University of Hawai’i. Three of our four recent graduates stated they intended to transfer, and we shall have to confirm their acceptance and actual transfer this fall.

Though we also do not have data on how many of our transfer students, over the years, have actually obtained 4-year degrees, or higher, we do know of some of our recent graduates and their progress in achieving higher degrees. Through our relationships with UH and the summer internship programs they are offering our students, we have been fairly successful in recent years at sending our students on for higher degrees. Currently, we have 3 marine graduates working on BS degrees at UH Hilo and UH Manoa, at least 2 of our graduates are working on BS degrees at UH, and two have transferred into baccalaureate programs in China.

We will continue to work to add to our database. Ideally, we want to see more of our students actually completing 4-year degree programs as evidence of our own program success. Not having these data makes assessing the true value of our program weak.

1. Program Student Learning Outcome Assessment

Marine program level assessment occurred for the first time this academic year and we evaluated all four program learning outcomes. The results of this evaluation are available by contacting the Director of Academic Programs or the Division of Natural Sciences and Mathematics. Results from the assessment will be used to better design assessment strategies for the upcoming academic year and also will be used to implement some program and classroom level changes this upcoming academic year.

1. Classroom Level Assessment From Program Courses

Instructors submitted classroom level assessment reports to the Director of Academic Programs for Fall 2010 – Summer 2011. Each instructor evaluated all student learning outcomes for each course taught.

H .

a.) Discussion of Findings

Clearly we are missing essential baseline data necessary to evaluate any changes in program trends. All we have to operate with, at this time, is the institutional knowledge of those instructors who have experienced changes in the program dynamics over time. Unfortunately, that cannot yet be justified in accurate quantitative terms and so are instead subjective opinions. Unfortunately, many of the recommendations made below come from these opinions and not necessarily from data shown in this report. Some of these gaps in data can be filled in over the next year, but for much of these data, it is simply too late.

We do know that our program majors are increasing and we know that this last year has brought much pressure on our program to also provide much needed science with lab courses for non-majors, especially oceanography and marine biology. We have had to exceed class limits, often, in these two courses to meet these needs. Ideally, class size should not exceed 20 students for these two courses. To solve problems, instructors have run a second lab section, but that means having a lecture with 30 students and a few lab sections of 15 students each. The classrooms are simply not designed to comfortably seat but 20 students, and so 30 makes for an uncomfortable learning environment.

Completion rates in our program courses are within acceptable ranges, and where we see lower rates are primarily in courses also occupied by non-majors. And, though the cost per seat in our program is high, we offer excellent experiences for our students with extensive field work and internships. We have to operate boats, purchase fuel, and pay for boat and bus drivers. It is likely time to consider raising the cost for lab fees to $50 instead of merely $25.

b.) Recommendations

* Limit, and honor that limit, of no more than 20 students in marine biology and oceanography classes. Instead of overcrowding, offer more sections. An instructor should not have to teach a free lecture of 10 additional students with only the pay to run one additional lab. We need to be fair to both faculty and students. If we aren’t meeting the needs of all students by offering enough science courses, the division must seek the services of additional faculty through part-time employment, or additional full-time divisional faculty. Further, the college has to look at admissions numbers and be sure the college can support all students who are accepted. If the college cannot accommodate such large numbers and so many programs, higher admissions criteria have to be applied, programs must be eliminated, or more faculty must be hired. Something has to give, but overcrowding will have to end.
* We will need to track the number of majors completing marine biology so that we can decide how many sections of fishery biology and management and aquaculture will need to be offered in the coming years. Typically, the class size is small for aquaculture due to the nature of the class and required field work. Fisheries might need to also be offered in the fall semester or over the summer.
* With the addition of a SCUBA course and a revival of the geology course, we will have to consider indicating these two courses as highly recommended, in the college catalog, for program majors. Further, having SCUBA as an option will now serve to eliminate the one general complaint we had on the exit surveys from students who felt disappointed they did not receive opportunities to dive.
* Marine program instructors have agreed that we should change our program requirements regarding ichthyology. We are currently discussing the elimination of ichthyology and instead requiring a cellular and molecular biology course. Discussions with University faculty who work with our students have yielded a concern over lacking necessary base knowledge in cellular and molecular biology. When we teach higher-level courses, such as ichthyology, we also notice a gap in this foundational knowledge. Much of the ichthyology course is dedicated to teaching general biology so that students can understand the complex physiological processes occurring in fish, when ideally more time should be spent on the fish. Curriculum would need to be developed for the cellular and molecular biology course. This course would be likely to transfer and to fulfill a basic requirement for a 4-year degree; whereas ichthyology would not (typically this is an upper division course).
* Marine program instructors have also discussed and agreed that we should seriously consider eliminating the marine ecology requirement, and instead offer a general course in ecology. This offers a broader foundation for our marine science majors and it would also be a course that is simultaneously more appealing and available to non-majors. This course already exists as SC 110 Introduction to Ecology, and so we would merely need to update the outline.
* We will also consider the importance of GIS to the field and perhaps as a requirement or highly recommended course.
* We shall continue discussion on creating a broader degree program: A.S. in Marine and Environmental Science.
* Though we are very pleased to see such a large increase in program numbers, we do have some concern as to whether or not this region can support 50 or more marine science graduates with genuine employment opportunities. We need to collect data on employment opportunities and ensure that we are directing our students into studies that lead to an ability to find and retain employment locally, regionally, and globally.
* Consider raising the lab fee for students from $25 to $50.