FLORIDA GULF COAST UNIVERSITY
College of Arts and Sciences
Marine Science Program
Integrated Program Matrix
Synthesis & Revision – May 2009

University and Program Learning Goals and Outcomes	Program Assessment Plan and Criteria	Use of Assessment Results for Continuous Program Improvement 2005-06 (Due February 06)	Use of Assessment Results for Continuous Program Improvement 2006-07 (Due February 07)	Use of Assessment Results for Continuous Program Improvement 2007-08 (Due February 08)
Aesthetic Sensibility (University Level) A. Know and understand the variety of aesthetic frameworks B. Analyze and evaluate aesthetic principles at work C. Collaborate in projects involving aesthetic awareness and/or analysis Aesthetic Sensibility (Program Level) Students will be able to: • Demonstrate the development of a knowledge base that includes the prevailing scientific paradigms, the historical nature of these paradigms, and the aesthetic considerations of that knowledge, including the origin of life on earth, and the mechanisms of evolution that shape that life, including an emphasis on natural selection. (BCS 1010C, BSC 1011C, GLY 1000C, OCE 3008C, OCB 4043C, GLY 3603C, ISC 3145C, PCB 3043, OCB 4936)	Plan: This learning outcome will be assessed through a program standardized Pre- and Post-Test. Questions specifically addressing the prevailing scientific paradigms within Marine Science, and their historical development, will be included on this Pre- and Post-Test. The standardized Pre- and Post-Test will be administered to Marine Science students when they enter Oceanography (OCE 3008C), a gateway course to program, and then again in the Senior Seminar in Marine Science (capstone) course (OCB4936) Criteria: Students will not be notified before they are giving this standardized test; also, student's scores on the Pre- and Post-Test will be assess using a paired t-test in order to track their learning as it applies to this specific learning goal. The performance target for the standardized test is a statistically significant higher score (one-tailed test) on the post–test and that 95% score 70% or higher and 75% score 80% or better. If students are not learning or retaining this information, which would be reflected by student's scores being lower on the Post-Test than the Pre-Test, then course content will be adjusted with the hope that this rectifies the failure to meet this learning goal.			

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A Culturally Diverse Perspective (University Level) A. Know and understand diversity in local/global communities B. Analyze and evaluate the impact of cultural differences C. Participate in projects involving interaction with diverse people, ideas, & values A Culturally Diverse Perspective (Program Level) Students must demonstrate: • Ability to understand and appreciate the development and implementation of public policy. (ISC 3120, ISC 4930, EVR 4940, IDS 3303) • Ability to solve problems in individual and group settings and incorporating a diversity of values and approaches (All core & elective courses)	Plan: The ability to understand and appreciate public policy will be assessed directly at two critical points within the program. The first is within the Scientific Process course, taken early in the program, where they will design a research project, compose a written proposal, and then defend it in an oral presentation. This proposal will be evaluated by 3 faculty members (objective outsiders but former instructors of the course) using a detailed scoring rubric for learning outcomes. Additionally, this will be assessed indirectly by student surveys that are given at the completion of one the Senior Seminar course asking them to self-evaluate their own achievements with specific embedded questions geared toward each of the learning outcomes. Criteria: All questions on the various rubrics will be scored using a 1 to 4 scale, with 4 being the highest. The program goal is that 95% of the responses will score a 2 or higher, and 75% will score a 3 or higher.			

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An Ecological Perspective (University Level) A. Know issues of ecological/ economic sustainability B. Analyze and evaluate local & global ecological issues C. Participate in ecological/environmental projects An Ecological Perspective (Program Level) Students will be able to: 1) Critically evaluate arguments and assumptions and interpret published data relating to marine science. (Academic Learning Compact 1.1) (All core & elective courses) 2) Apply basic knowledge from the core scientific disciplines (i.e., biology, geology, chemistry, physics, and mathematics) in an interdisciplinary fashion that address real-world problems in marine systems. (Academic Learning Compact 1.2) (All core & elective courses) 3) Utilize the scientific process to form hypotheses and design studies to gather and analyze data from which to draw scientifically valid conclusions. (Academic Learning Compact 1.3) (All core & elective courses)	Plan: First, a standardized Pre- and Post-Test will be administered to Marine Science students when they enter Oceanography (OCE 3008C), and then again in the Senior Seminar in Marine Science course (OCB4936). Second, student research proposals generated during the Scientific Process course (ISC3120) will be evaluated by 3 faculty members (objective outsiders but former instructors of the courses). Third, student presentations, describing either a senior internship or senior research project, made in the Senior Seminar course will be assessed, using rubrics (specific to each) geared towards learning outcomes, by both classmates (a sample 3 internship and 3 student project, picked at random) and by at least 3 faculty, including one faculty member outside program (will score all presentation). Fourth, student's completing an internship will also be assessed based on a report (consisting of a rubric scoring learning outcomes) completed by their internship supervisor (external). Lastly, students will be given a survey at the completion of the Senior Seminar course asking them to self-evaluate their own achievements with specific embedded questions geared toward each of the learning outcomes. Criteria: Performance targets established for this assessment are as follows: all questions on the various rubrics are answered using a score from 1 to 4 (with 4 being the highest) - the program goal is that 95% of the responses will score a 2 or higher and 75% or more will score a 3 or higher. Student's scores on the Pre- and Post-Test will be compared statically using a pair-t test in order to track their learning as it applies to this specific learning goal. The performance target for the standardized test is a statistically significant higher score (one-tailed test) on the post–test and that 95% score 70% or higher and 75% score 80% or better.	Direct Assessment: Instruments have included a Summary Response assignment based on an ecological issue or perspective that stresses critical thinking and writing. The goal was for a 1point improvement in overall scores (on a 6 point scale) from students in Composition I (8% assessed) and Connections (20% assessed) moving from the lower range (1-2) to the middle range (3-4). Students in Liberal Studies Capstone (69% assessed) course were also given the instrument, with a 1 point improvement (upper range of 5-6) expected in their average score over and above that of Connections. The goal for Composition I was exceeded, with average scores at 2.7. The goal for Connections course students was met, with average scores in the middle range (3.31). The Capstone course goal was not met, with scores at 3.95 (native students scoring 4.0 and upper level transfers scoring 3.91). Final results suggest that students in the Connections class are achieving the level desired. However, those completing the Liberal Studies degree and Capstone course had lower than expected results, perhaps due to lack of abilities in critical thinking, writing, or in knowledge of ecological issues. Overall inter-rater reliability was at 86%. Indirect Assessment: Students in the Connections class took a survey relating to their knowledge of ecological perspective and responded on a Likert Scale of 1-5 (5 being the highest); an overall average score of 4 was expected for all students. Average scores were below the expected 4.0 level. Students scored their understanding of the program's overall goals at 3.83; their understanding of ecological perspective importance at 3.62; and their understanding of Community Involvement and Awareness at 3.75. Students that completed both the on campus workshop and community service project exceeded the 4.0 expected level, those who completed only one or the other did not. Plans for Continuous Improvement: No immediate changes are planned for the Composition I class, although this class might become a site for advancing ecological literacy in the future. In Connections, the ecological literacy program (Wings of Hope) has been streamlined to be introduced slightly later in the semester. A detailed assignment sheet has been developed, providing instructors and students a	Direct Assessment: A student research proposal, generated through ISC 3120, as well as a student poster presentation describing senior internships were used in assessment. The program's goal was for 95% of responses to score a 3 or higher (of 5) and 75% or more will score a 4 or higher. This goal was met as 100% of scores from both student and faculty reviewer of the poster were a 3 or higher, with 88% receiving a score of 4 or higher. However, the results from the research proposal assessment indicated that the goal was not met in all cases. Two of the five proposals demonstrated a deficiency in the students' use of statistical techniques, simulation models, or a system approach. Additionally, students' ability to formulate a clear hypothesis and develop an approach and specific methods to test that hypothesis also fell slightly short of the 95% performance target (87%). Possible contributing factors for these results include a small sample size among a small marine science student population, the transition in learning objectives and revision of the rubrics that prevented pooling across terms, as well as the presence of two faculty reviewers who were new to the program. A larger and longer-term dataset with additional measures is needed for a more complete analysis. Indirect Assessment: The student survey indicated a strong agreement between the self-evaluations and faculty scores. The lowest score of 3 was given in areas of oral and written skills regarding presentation of science/ internship experience as well as mastery of techniques or tools in internship. Higher scores of 4 and 5 were given in other areas including ecological aspects and analyzing data. Plans for Continuous Improvement: Each faculty member will take on and mentor undergrads into their upper-level courses. A system will be developed to track and forecast the number of upcoming students who will be conducting science projects or internships. A senior capstone seminar will be added to the program curriculum, with an applied statistics course, currently in development by the Mathematics program, added as an elective. Results of this assessment will be presented to instructors of ISC 3120 to determine whether students can solicit greater feedback from mentors earlier in drafting their proposals. Rubrics will also be shared with faculty and students to make them aware of requirements. Finally, faculty reviewers	

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		clear indication of what the program entails along with a clear grading rubric detailing how students will be graded. In addition, the number of Wings of Hope programs in the spring semester have been reduced so that several Connections sections will not have a designated service learning activity; students in these sections will need to work towards developing their own activity. Finally, no immediate changes were proposed for the upper level courses until feedback has been gathered from the QEP assessment.	will meet prior to scoring student work to review rubric criteria.	

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Effective Communication (University Level) A. Know principles for effective communication B. Organize thoughts and compose ideas C. Participate in collaborative communication projects Effective Communication (Program Level) All Marine science students will demonstrate: 1) Utilize the scientific process to form hypotheses and design studies to gather and analyze data from which to draw scientifically valid conclusions; 2) Communicate effectively, using the language and concepts of marine science, employing appropriate presentation technologies. (Academic Learning Compact 1.4) (All core & elective courses)	Plan: First, student research proposals generated during the Scientific Process course (ISC3120) will be evaluated by 3 faculty members (objective outsiders but former instructors of the courses) Second, student presentations, describing either a senior internship or senior research project, made in the Senior Seminar course will be assessed, using rubrics (specific to each) geared towards learning outcomes, by both classmates (a sample 3 internship and 3 student project, picked at random) and by at least 3 faculty, including one faculty member outside the program (will score all presentation).	Direct Assessment: A senior research project, presentation, or internship in ISC 3120 was used in assessment. The goal of the program was for 100% of responses to score a 3 or higher (out of 5) and 75% or more to score a 4 or higher. Of the only proposal evaluated, the faculty rated the students' proposal at 3 or higher in all of the questions except one dealing with the students' competency of using statistical techniques or a systems approach. These results suggest that the outcomes were otherwise all met. The shortfall on one question is not significant, due to the small sample size and because the question's content is beyond the scope of ISC 3120. Indirect Assessment: The student survey indicated no statistical difference between the self-evaluations and the direct measures, except the area of statistics and simulation models, where 75% of students scored a 3.8 (faculty scored a 4.2). This outcome will be examined in coming semesters with a great sample size. Otherwise, all other programmatic and university-level outcomes are satisfied. Plans for Continuous Improvement: Although sample sizes for both assessment instruments are too low to justify significant adjustments to curriculum and/or teaching methodology, faculty is committed to placing more emphasis on statistical analysis. Should subsequent rounds of assessment show similar shortfalls for this outcome (when sample size is higher) discussions will be opened with the mathematics faculty with hopes of better integrating the teaching of fundamentals in statistics and modeling with their application to the natural and physical sciences.	Direct Assessment: A student research proposal, generated through ISC 3120, as well as a student poster presentation describing senior internships were used in assessment. The program's goal was for 95% of responses to score a 3 or higher (of 5) and 75% or more will score a 4 or higher. This goal was met as 100% of scores from both student and faculty reviewer of the poster were a 3 or higher, with 88% receiving a score of 4 or higher. However, the results from the research proposal assessment indicated that the goal was not met in all cases. Two of the five proposals demonstrated a deficiency in the students' use of statistical techniques, simulation models, or a system approach. Additionally, students' ability to formulate a clear hypothesis and develop an approach and specific methods to test that hypothesis also fell slightly short of the 95% performance target (87%). Possible contributing factors for these results include a small sample size among a small marine science student population, the transition in learning objectives and revision of the rubrics that prevented pooling across terms, as well as the presence of two faculty reviewers who were new to the program. A larger and longer-term dataset with additional measures is needed for a more complete analysis. Indirect Assessment: The student survey indicated a strong agreement between the self-evaluations and faculty scores. The lowest score of 3 was given in areas of oral and written skills regarding presentation of science/ internship experience as well as mastery of techniques or tools in internship. Higher scores of 4 and 5 were given in other areas including ecological aspects and analyzing data. Plans for Continuous Improvement: Each faculty member will take on and mentor undergrads into their upper-level courses. A system will be developed to track and forecast the number of upcoming students who will be conducting science projects or internships. A senior capstone seminar will be added to the program curriculum, with an applied statistics course, currently in development by the Mathematics program, added as an elective. Results of this assessment will be presented to instructors of ISC 3120 to determine whether students can solicit greater feedback from mentors earlier in drafting their proposals. Rubrics will also be shared with faculty and students to make them aware of requirements. Finally, faculty reviewers will meet prior to scoring student work to review rubric criteria.	Direct Assessment: A student research proposal, generated through ISC 3120 and poster presentation were used in assessment. Average interclass correlation among the three reviewers scoring proposals was .79, approaching the program goal of .80 inter-rater reliability. Program goal was that 95% of responses score a 3 or higher (of 5), which was met in 3 of 7 areas. The goal that 75% or more score a 4 or higher was achieved in 4 of 7 areas. The areas scoring the highest linked to this learning objective indicating that students were communicating general concepts successfully. Indirect Assessment: The student survey indicated that the program target of 95% scoring a 3 or higher was achieved. Juniors did not score themselves as high as seniors, failing to meet the second program target of 75% scoring a 4 or higher. Seniors met this target in all four areas. Additionally, some students recognized a deficiency in their ability to formulate a clear hypothesis and develop an approach and specific methods to test that hypothesis. Plans for Continuous Improvement: Based on results from this and previous assessment, faculty feels that substantive changes and curriculum are required. All 4 core marine science courses should be required (GLY 4702C Coastal Watershed Geology, OCB 4043C Marine Ecology, OCC 4002C Marine Chemistry, OCE 3003 Physical Oceanography). A senior capstone course for presenting research and internship experiences will be added to the curriculum. A biometry class will be added and each of the core marine science classes will increase emphasis on statistics and begin developing a coordinated module across core classes. Finally, the program assessment will include: an entrance exam given in Oceanography and again at the completion of the new capstone class; all rubrics will be revised to be scored from 1-4 to reduce bias toward selecting 3; the senior exit survey will be revised to cross-link it more closely with specific assessments carried out by faculty.

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Ethical Responsibility (University Level) A. Know and understand ethical issues B. Analyze and evaluate ethical issues in a variety of contexts C. Participate in collaborative projects involving ethical analysis and/or decisions Ethical Responsibility (Program Level) All science students must demonstrate: • Awareness of the ethical aspects of: 1) science; 2) their conduct as scientists; and 3) their conduct as citizens. (ISC 3120, IDS 3300, IDS 3920) • Ability to understand and appreciate the development and implementation of public policy. (ISC 3120, IDS 3300, IDS 3920)	Plan: First, student research proposals generated during the Scientific Process course (ISC3120) will be evaluated by 3 faculty members (objective outsiders but former instructors of the courses). Second, student presentations, describing either a senior internship or senior research project, made in the Senior Seminar course will be assessed, using rubrics (specific to each) geared towards learning outcomes, by both classmates (a sample 3 internship and 3 student project, picked at random) and by at least 3 faculty, including one faculty member outside program (will score all presentation). Third, student's completing an internship will also be assessed based on a report (consisting of a rubric scoring learning outcomes 1 and 2) completed by their internship supervisor (external). Lastly, students will be given a survey at the completion of the Senior Seminar course asking them to self-evaluate their own achievements with specific embedded questions geared toward each of the learning outcomes. Criteria: Performance targets established for this assessment are as follows: all questions on the various rubrics are answered using a score from 1 to 4 (with 4 being the highest) - the program goal is that 95% of the responses will score a 2 or higher and 75% or more will score a 3 or higher.			

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Information Literacy (University Level) A. Identify and locate sources of information B. Analyze and evaluate information in a variety of contexts C. Participate in collaborative analysis/application of in formation Information Literacy (Program Level) All science students must demonstrate: • The ability to gather and critically evaluate information utilizing library research skills; apply experimental design in laboratory or field settings, and use technology to gather information.(ISC 3120, ISC 4930, EVR 4910, EVR 4940, OCB 4936, plus most core & elective courses) • Ability to analyze information both qualitatively and quantitatively.(ISC 3120, ISC 4930, EVR 4910, EVR 4940 OCB 4936, plus most core & elective courses) • Critically evaluate arguments and assumptions and interpret published data relating to marine science (All core & elective courses) • Apply basic knowledge from the core scientific disciplines (i.e., biology, geology, chemistry, physics, and mathematics) in an interdisciplinary fashion that address real-world problems in marine systems(All core & elective courses) • Utilize the scientific process to form hypotheses and design studies to gather and analyze data from which to draw scientifically valid conclusions; (All core & elective courses)	Plan: First, a standardized Pre- and Post-Test will be administered to Marine Science students when they enter Oceanography (OCE 3008C), and then again in the Senior Seminar in Marine Science course (OCB4936). Second, student research proposals generated during the Scientific Process course (ISC3120) will be evaluated by 3 faculty members (objective outsiders but former instructors of the courses). Third, student presentations, describing either a senior internship or senior research project, made in the Senior Seminar course will be assessed, using rubrics (specific to each) geared towards learning outcomes, by both classmates (a sample 3 internship and 3 student project, picked at random) and by at least 3 faculty, including one faculty member outside program (will score all presentation). Fourth, student's completing an internship will also be assessed based on a report (consisting of a rubric scoring learning outcomes 1 and 2) completed by their internship supervisor (external). Lastly, students will be given a survey at the completion of the Senior Seminar course asking them to self-evaluate their own achievements with specific embedded questions geared toward each of the learning outcomes. Criteria: Performance targets established for this assessment are as follows: all questions on the various rubrics are answered using a score from 1 to 4 (with 4 being the highest) - the program goal is that 95% of the responses will score a 2 or higher and 75% or more will score a 3 or higher. Student's scores on the Pre- and Post-Test will be compared statically using a pair-t test in order to track their learning as it applies to this specific learning goal. The performance target for the standardized test is a statistically significant higher score (one-tailed test) on the post–test and that 95% score 70% or higher and 75% score 80% or better. The foundations of information literacy are developed in the Scientific Process course and then re-emphasized in all subsequent courses. Problems of achievement will be addressed by faculty teaching the course; those faculty members will work through consensus to improve the course's structure and application.	Direct Assessment: A senior research project, presentation, or internship in ISC 3120 was used in assessment. The goal of the program was for 100% of responses to score a 3 or higher (out of 5) and 75% or more to score a 4 or higher. Of the only proposal evaluated, the faculty rated the students' proposal at 3 or higher in all of the questions except one dealing with the students' competency of using statistical techniques or a systems approach. These results suggest that the outcomes were otherwise all met. The shortfall on one question is not significant, due to the small sample size and because the question's content is beyond the scope of ISC 3120. Indirect Assessment: The student survey indicated no statistical difference between the self-evaluations and the direct measures, except the area of statistics and simulation models, where 75% of students scored a 3.8 (faculty scored a 4.2). This outcome will be examined in coming semesters with a great sample size. Otherwise, all other programmatic and university-level outcomes are satisfied. Plans for Continuous Improvement: Although sample sizes for both assessment instruments are too low to justify significant adjustments to curriculum and/or teaching methodology, faculty is committed to placing more emphasis on statistical analysis. Should subsequent rounds of assessment show similar shortfalls for this outcome (when sample size is higher) discussions will be opened with the mathematics faculty with hopes of better integrating the teaching of fundamentals in statistics and modeling with their application to the natural and physical sciences.		Direct Assessment: A student research proposal, generated through ISC 3120 and poster presentation were used in assessment. Average interclass correlation among the three reviewers scoring proposals was .79, approaching the program goal of .80 inter-rater reliability. Program goal was that 95% of responses score a 3 or higher (of 5), which was met in 3 of 7 areas. The goal that 75% or more score a 4 or higher was achieved in 4 of 7 areas. The areas scoring the lowest were: research question and hypothesis, methods, and approach. These deficiencies link to this learning objective. Indirect Assessment: The student survey indicated that the program target of 95% scoring a 3 or higher was achieved. Juniors did not score themselves as high as seniors, failing to meet the second program target of 75% scoring a 4 or higher. Seniors met this target in all four areas. Additionally, some students recognized a deficiency in their ability to formulate a clear hypothesis and develop an approach and specific methods to test that hypothesis. Overall, the assessment is consistent with the findings of previous assessments and indicates that steps should be taken to improve student learning in regards to this learning objective. Plans for Continuous Improvement: Based on results from this and previous assessment, faculty feels that substantive changes and curriculum are required. All 4 core marine science courses should be required (GLY 4702C Coastal Watershed Geology, OCB 4043C Marine Ecology, OCC 4002C Marine Chemistry, OCE 3003 Physical Oceanography). A senior capstone course for presenting research and internship experiences will be added to the curriculum. A biometry class will be added and each of the core marine science classes will increase emphasis on statistics and begin developing a coordinated module across core classes. Finally, the program assessment will include: an entrance exam given in Oceanography and again at the completion of the new capstone class; all rubrics will be revised to be scored from 1-4 to reduce bias toward selecting 3; the senior exit survey will be revised to cross-link it more closely with specific assessments carried out by faculty.

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Problem-Solving Abilities (University Level) A. Understand multi/interdisciplinary nature of knowledge B. Apply critical, analytical creative and systems thinking C. Work individually and collaboratively to recognize and solve problems Critical Thinking and Problem-Solving Abilities (Program Level) All science students must demonstrate: • Apply basic knowledge from the core scientific disciplines (i.e., biology, geology, chemistry, physics, and mathematics) in an interdisciplinary fashion that address real-world problems in marine systems(All core & elective courses) • Utilize the scientific process to form hypotheses and design studies to gather and analyze data from which to draw scientifically valid conclusions; (All core & elective courses)	Plan: First, student research proposals generated during the Scientific Process course (ISC3120) will be evaluated by 3 faculty members (objective outsiders but former instructors of the courses). Second, student presentations, describing either a senior internship or senior research project, made in the Senior Seminar course will be assessed, using rubrics (specific to each) geared towards learning outcomes, by both classmates (a sample 3 internship and 3 student project, picked at random) and by at least 3 faculty, including one faculty member outside program (will score all presentation). Third, student's completing an internship will also be assessed based on a report (consisting of a rubric scoring learning outcomes) completed by their internship supervisor (external). Lastly, students will be given a survey at the completion of the Senior Seminar course asking them to self-evaluate their own achievements with specific embedded questions geared toward each of the learning outcomes. Criteria: Performance targets established for this assessment are as follows: all questions on the various rubrics are answered using a score from 1 to 4 (with 4 being the highest) - the program goal is that 95% of the responses will score a 2 or higher and 75% or more will score a 3 or higher. The foundations of critical thinking, particularly in science, are developed in the Scientific Process course and then re-emphasized in all subsequent courses. Problems of achievement will be addressed by faculty teaching the course; those faculty members will work through consensus to improve the course's structure and application. In addition, teaching techniques and exercises in all courses will be evaluated by the Marine Science faculty.	Direct Assessment: A senior research project, presentation, or internship in ISC 3120 was used in assessment. The goal of the program was for 100% of responses to score a 3 or higher (out of 5) and 75% or more to score a 4 or higher. Of the only proposal evaluated, the faculty rated the students' proposal at 3 or higher in all of the questions except one dealing with the students' competency of using statistical techniques or a systems approach. These results suggest that the outcomes were otherwise all met. The shortfall on one question is not significant, due to the small sample size and because the question's content is beyond the scope of ISC 3120. Indirect Assessment: The student survey indicated no statistical difference between the self-evaluations and the direct measures, except the area of statistics and simulation models, where 75% of students scored a 3.8 (faculty scored a 4.2). This outcome will be examined in coming semesters with a great sample size. Otherwise, all other programmatic and university-level outcomes are satisfied. Plans for Continuous Improvement: Although sample sizes for both assessment instruments are too low to justify significant adjustments to curriculum and/or teaching methodology, faculty is committed to placing more emphasis on statistical analysis. Should subsequent rounds of assessment show similar shortfalls for this outcome (when sample size is higher) discussions will be opened with the mathematics faculty with hopes of better integrating the teaching of fundamentals in statistics and modeling with their application to the natural and physical sciences.		

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Technological Literacy (University Level) A. Develop knowledge of modern technology B. Process information through use of technology C. Collaborate with others using technology tools Technological Literacy (Program Level) All science students must demonstrate: • Utilize the scientific process to form hypotheses and design studies to gather and analyze data from which to draw scientifically valid conclusions (All core & elective courses) • Communicate effectively, using the language and concepts of marine science, employing appropriate presentation technologies. (All core & elective courses) • Effectiveness in both laboratory and field settings (All core & elective courses.)	Plan: First, student research proposals generated during the Scientific Process course (ISC3120) will be evaluated by 3 faculty members (objective outsiders but former instructors of the courses). Second, student presentations, describing either a senior internship or senior research project, made in the Senior Seminar course will be assessed, using rubrics (specific to each) geared towards learning outcomes, by both classmates (a sample 3 internship and 3 student project, picked at random) and by at least 3 faculty, including one faculty member outside program (will score all presentation). Third, student's completing an internship will also be assessed based on a report (consisting of a rubric scoring learning outcomes) completed by their internship supervisor (external). Lastly, students will be given a survey at the completion of the Senior Seminar course asking them to self-evaluate their own achievements with specific embedded questions geared toward each of the learning outcomes. Criteria: Performance targets established for this assessment are as follows: all questions on the various rubrics are answered using a score from 1 to 4 (with 4 being the highest) - the program goal is that 95% of the responses will score a 2 or higher and 75% or more will score a 3 or higher. Plan: Effectiveness in both laboratory and field settings will be assessed using Course Performance & Products. The effectiveness of the program's ability to provide marine science-specific content knowledge will be evaluated through student performance within individual courses. Measures include: examinations, and group and individual projects and presentations. Course syllabi detail the nature of these assignments. Criteria: This assessment tool will be developed in a subsequent assessment round. Most of the program's courses are laboratory and field based. Students have numerous opportunities to work with instruments in both settings. Consequently, failure in this outcome reflects a major shortcoming of the program, and a major revision of the curriculum would be required.	Direct Assessment: A senior research project, presentation, or internship in ISC 3120 was used in assessment. The goal of the program was for 100% of responses to score a 3 or higher (out of 5) and 75% or more to score a 4 or higher. Of the only proposal evaluated, the faculty rated the students' proposal at 3 or higher in all of the questions except one dealing with the students' competency of using statistical techniques or a systems approach. These results suggest that the outcomes were otherwise all met. The shortfall on one question is not significant, due to the small sample size and because the question's content is beyond the scope of ISC 3120. Indirect Assessment: The student survey indicated no statistical difference between the self-evaluations and the direct measures, except the area of statistics and simulation models, where 75% of students scored a 3.8 (faculty scored a 4.2). This outcome will be examined in coming semesters with a great sample size. Otherwise, all other programmatic and university-level outcomes are satisfied. Plans for Continuous Improvement: Although sample sizes for both assessment instruments are too low to justify significant adjustments to curriculum and/or teaching methodology, faculty is committed to placing more emphasis on statistical analysis. Should subsequent rounds of assessment show similar shortfalls for this outcome (when sample size is higher) discussions will be opened with the mathematics faculty with hopes of better integrating the teaching of fundamentals in statistics and modeling with their application to the natural and physical sciences.		

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Synthesis & Revision – May 2009

University and Program Learning Goals and Outcomes	Program Assessment Plan and Criteria	Use of Assessment Results for Continuous Program Improvement 2005-06 (Due February 06)	Use of Assessment Results for Continuous Program Improvement 2006-07 (Due February 07)	Use of Assessment Results for Continuous Program Improvement 2007-08 (Due February 08)
Community Awareness and Involvement (University Level) A. Know and understand relationships between individuals and their communities B. Analyze, evaluate and assess human needs and practices C. Participate collaboratively in community service projects Community Awareness and Involvement (Program Level) All science students must demonstrate: • Awareness of the societal aspects and implications of science on everyday life. (ISC 3120, IDS, 3300, IDS 3920) • Ability to understand and appreciate the development and implementation of public policy. (ISC 3120, ISC 4930, EVR 4940) • Ability to solve problems in individual and group settings and incorporating a diversity of values and approaches. (All core & elective courses.)	Plan: Knowledge of the interaction between science and society, and the ability to understand and appreciate the development and implementation of public policy will be assessed using: • Scientific Process Proposal and Capstone Project (Direct Assessment): Marine Science students demonstrate their awareness of the scientific method and its impact upon society at two critical points within the program. The first is within the Scientific Process course, taken early in the program, where they design a research project, compose a written proposal, and then defend it in an oral presentation. Students will present their research project papers or posters developed for their capstone Senior Project Research & Presentation courses or their capstone Internship experience, within a college-wide forum. Criteria: In the Direct Assessment, program goal is that 95% of the responses will score a 2 or higher, and 75% will score a 3 or higher on rubrics. Plan: The ability to solve problems will be assessed using: • Course Performance & Products (Direct Assessment): The effectiveness of the program's ability to provide marine science-specific content knowledge will be evaluated through student performance within individual courses. Measures include: examinations, and group and individual projects and presentations. Course syllabi detail the nature of these assignments. These materials have yet to be assembled. • Senior Course Survey (Indirect Assessment): Students will be asked to self-assess their awareness of the scientific method and its impact upon society by completing a survey at the completion of one of their 4000-level undergraduate courses. This measure will complement the direct measure of achievement at the program's completion. Criteria: Direct Assessment, Course Performance & Products assessment materials will be developed in a subsequent round. See comments under Ethical Responsibility. For the Indirect Assessment, 75% of students will score an "agree or strongly agree" on the appropriate questions of the Senior Course Survey. Community awareness and involvement is implicitly derived in many introductory and upper-division courses. If this is not being achieved, an effort to explicitly consider community awareness will be developed. As the program adopts more responsibility for service learning, community involvement will become more intimately tied to Marine Science courses. (Cont'd.)			

Marine Science Program Integrated Program Matrix
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University and Program Learning Goals and Outcomes	Program Assessment Plan and Criteria	Use of Assessment Results for Continuous Program Improvement 2005-06 (Due February 06)	Use of Assessment Results for Continuous Program Improvement 2006-07 (Due February 07)	Use of Assessment Results for Continuous Program Improvement 2007-08 (Due February 08)
	Plan: Knowledge of the interaction between science and society, and the ability to understand and appreciate the development and implementation of public policy will be assessed using: 1) the Scientific Process course, taken early in the program, where they will design a research project, compose a written proposal, and then defend it in an oral presentation. This proposal will be evaluated by 3 faculty members (objective outsiders but former instructors of the course) using a detailed scoring rubric for learning outcomes; 2) in the Capstone course where students will present as a poster describing either a senior internship or senior research project which will be assessed using rubrics by at least 2 faculty members. Criteria: The program goal is that 95% of the responses will score a 2 or higher, and 75% will score a 3 or higher on rubrics. Plan: The ability to understand and appreciate public policy will be assessed directly at two critical points within the program. The first is within the Scientific Process course, taken early in the program, where they will design a research project, compose a written proposal, and then defend it in an oral presentation. This proposal will be evaluated by 3 faculty members (objective outsiders but former instructors of the course) using a detailed scoring rubric for learning outcomes. The second is the Capstone course where students will present as a poster describing either a senior internship or senior research project which will be assessed using rubrics by at least 2 faculty members. Criteria: The program goal is that 95% of the responses will score a 2 or higher, and 75% will score a 3 or higher on rubrics. Plan: The ability to effectively solve problem will be assessed directly using: 1) the Scientific Process course, taken early in the program, where they will design a research project, compose a written proposal, and then defend it in an oral presentation. This proposal will be evaluated by 3 faculty members (objective outsiders but former instructors of the course) using a detailed scoring rubric for learning outcomes; 2) in the Capstone course where students will present as a poster describing either a senior internship or senior research project which will be assessed using rubrics by at least 2 faculty members. Criteria: program goal is that 95% of the responses will score a 2 or higher, and 75% will score a 3 or higher on rubrics.			

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Marine Science Program Assessment Strategies

Six assessment strategies are proposed:

1. Scientific Process Proposal

Marine Science students demonstrate their awareness of the scientific method and its impact upon society at two critical points within the program. The first is within the Scientific Process course, taken early in the program, where they design a research project, compose a written proposal, and then defend it in an oral presentation. These proposals will be critiqued by objective, outside reviewers (faculty members) that will complete a survey ("Outside Reviewer Scientific Process Rubric"), after reviewing the proposal, for its adherence to the scientific method.
Outside Reviewer rubrics have been developed and were employed for the first time at the end of the Spring, 2005 semester. The following learning goals will be assessed using this strategy: 2,4,5,7,8,9

2. Pre- and Post-Testing

The effectiveness of the Marine Science program's ability to provide basic content knowledge relative to the fundamental paradigms in science (General Science Content Goals) will be evaluated through the use of pre- and post-programmatic testing. A standardized exam will be administered to Marine Science students at the time they enter their first core course (Oceanography) and again at the time of completion of the program, during the capstone Senior Seminar in Marine Science.
A pre-test for distribution at the conclusion of the Oceanography course was developed and administered at the end of the Spring, 2005 semester. The post-test will be developed and administered for the first time next academic year.
The following learning goals will be assessed using this strategy: 1,3,6

3 & 4. Capstone Project (research project or internship portfolio) Assessments by Peers and by Faculty.

At the completion of the program, student performance on their written or oral presentations coming out their experiences in Senior Project Research (EVR 4910) or Internship (EVR 4940), will be used to assess achievement of these learning goals. These presentations will be made in the Senior Seminar course will be assessed using rubrics (specific to each) geared towards learning outcomes by both classmates (a sample 3 internship and 3 student project, picked at random) and by at least 3 faculty, including one faculty member outside program (will score all presentation).
Rubrics for the capstone research and internship experiences will be developed next academic year.
The following learning goals will be assessed using this strategy: 3,4,5,6,7,8,9

5. Internship Supervisor Survey

Student's completing an internship will also be assessed based on a report (consisting of a rubric scoring specific learning outcomes) completed by their internship supervisor (external).
A rubric was developed at the end of the Spring, 2005 semester. The following learning goals will be assessed using this strategy:3,5,6,7,8

6. Senior Course Survey.

Students will be asked to self-assess their awareness of the scientific method and its impact upon society by completing a survey in the Senior Seminar in Marine Science (OCB 4936). This indirect measure will complement the direct measure (see strategy 1: Capstone Project) of achievement at the program's completion.
This Senior Course Survey rubric was developed and administered for the first time at the end of the Spring, 2005 semester.
This measure is intended to assess learning goals: 2,3,5,6,7,8