

NAME: W&M HHMI Undergraduate Science Education Program

INSTITUTION: College of William and Mary

SUMMER Chemistry and Biology Pre-Courses

Inputs	Strategies	Outputs	Outcomes		Impacts (Long Term)
			(Short Term)	(Medium Term)	
<p>Students from W&M - All students potentially interested in STEM majors</p> <p>Summer stipends for faculty, students and staff working on online pre-courses</p> <p>Salary support from William and Mary</p> <p>Faculty Advisory Committee: support and evaluate program</p> <p>Website to publicize program and disseminate results of program; mechanisms for tracking and evaluation</p> <p>IT support for project</p>	<p>Provide detailed online pre-courses for Introductory Biology and Introductory Chemistry that students can take before matriculating to ensure they are prepared for actual course</p> <p>Courses will be interactive and involve self-evaluation & metacognitive exercises</p> <p>Courses will review: "the least students needs to know"; quantitative skills; expectations for analysis problems; how to engage in active learning</p> <p>Make online tutors available for questions on online courses</p> <p>Schedule informal tutoring sessions- live and/or online</p> <p>Make results available to freshmen advisors to ensure that the students are placed appropriately</p>	<p>Number of students who participate in taking online pre-courses</p> <p>Number of faculty/students who mentor rising freshmen students in the program during the summer</p> <p>Number of advisors who use the results from the courses</p> <p>Number of outside users who access and use the online pre-courses</p>	<p>Students feel more confident about taking chemistry and biology; students perform better on exams and in course</p> <p>Students feel more comfortable with quantitative skills required for introductory courses</p> <p>Students develop a comfort level in discussing chemistry with colleagues and with professors; more readily ask for help when needed</p>	<p>Students perform much better in introductory chemistry and biology on midterm exams and on final exam</p> <p>Students continue their interest and involvement in STEM courses</p> <p>A greater number of students continue to major in STEM fields.</p> <p>Students perform better in subsequent chemistry and biology courses and in other courses requiring quantitative skills</p> <p>Students willing to try new and challenging courses because they know how to prepare for them; they use techniques taught in these online pre-courses</p>	<p>Increased number students are engaged in science-related activities and professions following graduation</p> <p>Students value integration of scientific research across levels of a discipline</p> <p>Institutions place a high value on providing preparation, particularly online courses and materials, for students taking Intro STEM courses; becomes widespread at WM and beyond</p> <p>Students pursue chemistry and chemistry-related fields; help more junior students overcome issues with introductory courses</p> <p>Institution makes permanent changes in advising to ensure that students have confidence and ability to succeed in freshmen courses; freshmen enrollment choices not left up to chance</p>

ONLINE "PRE-COURSES": EVALUATION FRAMEWORK

Evaluation Questions for OUTCOMES		Possible Data Collection Methods and Information Sources	Rank/Priority (include brief rationale)
<ol style="list-style-type: none"> 1. How effective were the pre-courses in instilling confidence to take introductory chemistry and biology? 2. Did the students' attitudes towards the use of quantitative approaches change for the positive? 3. How effectively did the students perform while in the courses? 4. What was the effect of the pre-courses in terms of longer term success and persistence of these students? 5. What impacts were there beyond the departments for the curriculum development activities? 	<ol style="list-style-type: none"> 1. <ol style="list-style-type: none"> a. Students show increased interest and confidence and willingness to take intro. chem and bio b. Students learn introductory material required for course c. Students value quantitative approaches d. Students less wary of active learning techniques 2. <ol style="list-style-type: none"> a. Students value math and quantitative approaches b. Students feel confident in the course overall c. Students seek out quantitative challenges in course d. Students ask for assistance in understanding math applications in course 3. <ol style="list-style-type: none"> a. Students perform better on exams b. Students perform better in course; better final grades 4. <ol style="list-style-type: none"> a. Students persist in STEM following Intro courses b. Course enrollment increases c. STEM majors increase d. Department creates additional courses modeled on this course e. Students take more courses in chemistry and biology 5. <ol style="list-style-type: none"> a. Intro courses in other departments employ similar courses b. More general paradigm for science pedagogy c. Additional curriculum development grants and awards that stress quantitative and pre-course approaches 	<ol style="list-style-type: none"> 1,2. <ol style="list-style-type: none"> a. Pre-Post Tests b. Entrance and Exit Questionnaire c. Interview d. Focus Group e. course grades f. Course/Classroom Observations g. Course Surveys 3. <ol style="list-style-type: none"> a. Data collection on course/curriculum changes (e.g., Enrollment for students) b. Exam grades; reports from tutors 4. <ol style="list-style-type: none"> a. Course enrollment data; student tracking of subsequent courses b. Interviews/reports from faculty and other curriculum developers c. Focus group of faculty and other curriculum developers - and Advisors using results d. Faculty CVs and portfolios 5. <ol style="list-style-type: none"> a. Long term tracking of participants and persistence Banner records; grades; post-grad. tracking b. Review of teaching workshop topics and teaching seminars; review of course offerings c. Assessment of teaching by department, institution d. Faculty CVs and portfolios e. Annual report of HHMI-funded activities and their impact f. Grant funding information g. Institutional funding reports 	<p>Items are ranked based on how soon they can be captured during and after program activities (strategies) have occurred. However all questions and measures will be evaluated during and after each activity in order to capture the ongoing, longer-term changes in impact. That is, we expect to see increasing impact over time.</p>