Pipelines to Pipets:

The Massasoit Biotechnician Training and Undergraduate Research Initiative

NSF ATE Award Number - DUE 1205020

Evaluation Report

February 14, 2013

Evaluation Team:

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I. Executive Summary

In May 2012, Massasoit Community College received a National Science Foundation (NSF) Advanced Technological Education (ATE) grant in support of its project, *Pipelines and Pipets: The Massasoit Biotechnician Training and Undergraduate Research Initiative*. The *Pipelines* project establishes a new Biotechnology degree option and a new Biotechnology certificate that directly respond to Life Science, Allied Health and Biotechnology industry needs for more highly skilled, entry-level laboratory technicians. The project builds on evidence from multiple studies that early undergraduate research improves retention and academic success in STEM disciplines and workforce competitiveness, and will result in new inquiry-based academic programs as well as an on-campus research community that will provide more intensive experiences and build practical skills.

Evaluation of the project is conducted by an in-house team comprised of the Grants Specialist, the Director of Institutional Research and the Associate Dean of Faculty and Instruction. This team measures Massasoit's progress toward meeting its goals and provides formative feedback to principals and administrators to inform improvements to the project through its completion. The team worked closely with the Principal Investigator (PI), Dr. Gilles Bolduc, to gather quantitative and qualitative data that addressed evaluation questions related activities, outcomes and impacts. Evaluation tools include various participant surveys, interviews, student enrollment and performance data, and validation of project outputs.

This report evaluates the first eight months of the *Pipelines* project. All planned activities for that period have been completed and evaluated. Major findings indicate that the new program has been successfully launched with the introduction of three new courses and approval of a new college certificate in Biotechnology. Enrollment in the new program and courses is slow, but highly diverse. Four students participated in the summer research internship opportunities with positive results for both students and mentors. Faculty has begun working to implement more inquiry-based learning into curriculum and is planning for a sustainable on-campus research program.

Recommendations are to expand student outreach to increase participation in both the new courses and program, and in the summer research experiences. The Co-PIs also must continue to seek more and more diverse internship mentors and industry partners to expand programming and diversify career awareness opportunities.

II. Background

A. Project Overview

Massasoit Community College has heeded the call for more trained professionals in STEM areas and leveraged the diversity and untapped potential of its student body with an aggressive program to build the pipeline for science professionals using a combination of career exploration, enhanced advising, undergraduate research and scholarships. These efforts are part of a Science Transfer Initiative (STI) underwritten in part with grants from NSF and the Balfour Foundation, and the Governor's STEM Advisory Council. Since the project began in 2006, Massasoit's Liberal Arts Transfer – Science (LATS) enrollment has tripled from 154 students to 468, LATS graduates have increased by one-third, and transfers have more than doubled annually. Female enrollment in LATS has increased from 103 to 303, while minority enrollment has risen from 67 to 203.

Though successful in increasing enrollment and graduates in the sciences, Massasoit recognized that its students needed options in the sciences that would make them career-ready in an abbreviated timeframe, and/or prepare them for transfer as full junior students at four-year institutions. To achieve this required additional coursework and the establishment of an industry-recognized credential. Thus, the Biology Department of the Science and Mathematics Division at Massasoit proposed to develop a Biotechnology option to its Liberal Arts Transfer Science Associate's Degree program (LATS – Biotechnology) as well a Biotechnology certificate through the *Pipelines* project. These options would enable students to become competitive in the job market quickly while preparing them for advancement academically and professionally.

Massasoit has set a goal to increase its capacity to fully prepare students for entry into the life sciences and biotechnology workforce with both appropriate knowledge and technically advanced skills. Massasoit will achieve this goal by completing the following objectives:

1. Introduce a new degree and a new certificate that offer students seeking to enter the biotechnology and life sciences sectors with industry-recognized credentials that truly align with employer needs and that provide the foundation for advancement of and within the field.
2. Expand the pipeline of workforce-ready STEM professionals, with a particular emphasis on increasing the number of underrepresented populations in the field, through undergraduate research and internship opportunities that prepare students to transition seamlessly from academic to professional labs.
3. Increase the capacity of Massasoit's science and math faculty to integrate research-like experiences into their curriculum to increase student retention and success, and to build students' practical skills and competencies.

Activities in the first year of the grant focused on introducing a summer research and internship program, improvements to the biotechnology laboratory, the establishment of three new courses and a new biotechnology certificate, and faculty development in writing science curriculum that incorporates inquiry-based learning and research-like experiences in the lab. The Principal Investigator was assisted

by three faculty Co-PIs, along with two industry partner mentors, and four students participated in an intensive research experience over the summer.

B. Evaluation Overview

The Pipelines evaluation is conducted by a qualified team comprised of internal college staff that have experience in project evaluation and that are not directly involved in project implementation, including staff from Grants, Institutional Research and Faculty and Instruction. This team met at the start of the project to establish benchmarks and to devise a complete methodology for project evaluation that included both formative and summative strategies of assessment. These assessments modeled the evaluation plan submitted with the proposal and used questions related to project inputs, activities and impacts to identify milestones and measures that would indicate progress toward objectives and goals. Evaluation activities were created for each project activity conducted during the course of the grant year.

Evaluation will ensure that the primary objectives of the project have been met. Briefly:

1. Introduce a new biotechnology degree and a new certificate that provides students with industry-recognized credentials
2. Expand the pipeline of workforce-ready STEM professionals, with a particular emphasis on increasing the number of underrepresented populations in the field
3. Increase the capacity of Massasoit's science and math faculty to integrate research-like experiences into their curriculum

With an overall goal of technically preparing students for entry into the biotechnology workforce, the evaluation will ultimately track participants' successful completion of a Massasoit degree/certificate in biotechnology, and will disaggregate these data by gender and ethnicity. Tracking will extend to pursuit of a higher degree and career placements following participant departure from Massasoit.

C. Evaluation Processes and Instruments

A combination of evaluation methods and tools is used to assess all major grant activities. Participants in all activities were provided with post-activity evaluation instruments that gauged the usefulness of activities that were conducted and identified strengths and areas for improvement. These survey instruments were principally derived from pre-existing survey instruments in use for similar projects. This will enable the project to compare results against results at other institutions and, in some cases, nationally. The team will use data collected from other survey instruments used at the college, and from the college and national databases to gauge progress and success. These results will inform project implementation in Years 2 and 3.

Specifically, the following evaluation components were used to assess project activities, progress and impact:

- A post-internship survey assessing student reaction to undergraduate research experience on campus or at an internship site that was derived from the URSSA (Undergraduate Research Student Self Assessment) Survey created by the URSSA team

at the University of Colorado at Boulder. The URSSA Survey has been thoroughly tested and validated, and is publically accessible at salgsite.org (Student Assessment of Learning Gains). Development of URSSA was supported by the National Science Foundation.

- A post-experience survey on research mentors' experiences and impressions of the intern that is a compilation of mentor surveys from a variety of sources, including NSF-funded Research Experiences for Undergraduates (REU) projects.
- A post-workshop evaluation completed by workshop participants, based on an evaluation provided by the CCURI (Community College Undergraduate Research Initiative) project evaluator, Candiya Mann, of the Social & Economic Sciences Research Center at Washington State University.
- Interviews with the PI, Co-PI, Mentors and Students about specific aspects of their experiences on several occasions.
- Students' registration data, persistence and grades in relevant courses from the college's Banner database.
- Students' course evaluations.
- Students' post-Massasoit academic persistence as evidenced by subsequent enrollment queries conducted through the National Student Clearinghouse (NSC).
- Students' job placement and career progress as self-reported by students in email and on social networking sites as well as through traditional follow-up surveys.

III. Evaluation Findings

The evaluation findings discussed below reflect on the first eight months of activity in Massasoit's *Pipelines* NSF ATE project.

A. Biotechnology Degree Option and Certificate Program

The primary goal of the Pipelines project is to create a skilled workforce in the biotechnology and life sciences sector. To achieve this, Massasoit proposed to establish a new biotechnology certificate and a new degree option that will adequately prepare students and provide industry-recognized credentials for careers in this sector.

The Biotechnology certificate was approved by Massasoit's curriculum committee, and required coursework included two new, four-credit science courses and a one-credit seminar course developed through this grant. Students can choose to enroll in just the Biotechnology certificate program to earn a credential for entry-level lab positions, or to add skills to an existing B.S. degree for more advanced career placement. All credits earned in the biotechnology certificate program can also be applied to the Liberal Arts Transfer – Science (LATS) associate degree to provide a biotechnology focus within that degree. Students who choose to co-enroll in both will earn a certificate on the way to earning a degree, and will be qualified for an entry-level job and better prepared for advanced coursework and transfer to a four-year institution.

In fall 2012, the first semester the Biotechnology pathway was offered: five students declared the biotechnology certificate as a primary or secondary major, three additional students have declared the biotechnology certificate as a primary major in spring 2013. Underrepresented populations comprise a large percentage of students in this major. Three-quarters of the students are female, and half are minorities, as detailed in Table 1 below.

Table 1. Demographics of Biotechnology Certificate Majors

Indicators	Students
Total Unique Students	8
% Female	75%
% Minority	50%
% Both female and minority	50%
% Enrolled in certificate program only	50%

Three courses were created for the biotechnology certificate: *Topics in Molecular Biology, Cell Biology,* and *Seminar in Biotechnology*. *Topics in Molecular Biology* was piloted in fall 2012, with a class of three students. One student is a Biotech certificate student only, one is majoring in the Biotechnology certificate and in LATS and one is an LATS major only. All students passed the course with exceptional grades. Student opinions on the quality of the course and individual aspects of it were all in the good to excellent range, as indicated in Table 2 below. The new *Cellular Biology* and *Seminar in Biotechnology* courses will be piloted for the first time in spring 2013. Syllabi for all three courses have been included in the appendices.

Table2. Topics in Molecular Biology Student Course Evaluation Results

	Excellent	Very Good	Good	Fair	Poor	Very Poor	No Answer
The course as a whole	2	-	-	-	-	-	1
The course content	1	1	1	-	-	-	-
Course organization	1	-	2	-	-	-	-
Amount learned in the course	1	1	1	-	-	-	-
Relevance and usefulness of course content	1	1	1	-	-	-	-
Combined Evaluation	**6**	**3**	**5**	-	-	-	**1**

B. Summer Research/Internships

Massasoit introduced its first on-campus summer research program in 2012, coinciding with the opening of its new Biotechnology laboratory that was equipped in part through NSF ATE funding. In conjunction with this intensive academic research experience, Massasoit expanded research opportunities through internships at industry partner labs. In total, four students were supported in full-time research through grant activities.

Students were recruited from Full Time Equivalent second-year Liberal Arts Transfer-Science (LATS) students through announcements in science classes. Four students applied to participate in this competitive program, and completed an application that included a written statement of reasons for applying and expectations for the experience, a letter of recommendation from a science faculty, a list of relevant coursework, and GPA. Applicants were screened by the PI for qualifications, and were assessed and interviewed by the research mentors for placement.

As shown in Table 3, underrepresented groups made up the majority of students included in the research experiences, while mentors included only one female and no minorities.

Table 3. Demographics of Research Participants

Indicators	Students	Mentors
Total Participants	4	3
% Female	75%	33%
% Minority	75%	0%
% Both Female and Minority	50%	0%

All students completed the nine week paid research experience, however only one student completed the post-experience evaluation. While adding insight, the evaluation results detailed in Table 4 below reflect the opinions of only a single student. The student that completed the evaluation reported moderate to good gains in nearly all areas surveyed, found the experience excellent in most respects, and agreed or strongly agreed that s/he was prepared for advanced coursework, transfer and a job as a result. Further, the experience more than satisfied the student in all areas.

Table 4. Student Research Experience Evaluation Results

Questions related to gains from the experience	No Gains	Little Gain	Moderate Gain	Good Gain	Great Gain	No Answer
How much did you gain in your ability to think and work like a scientist as a result of your most recent research experience? (8 related questions x 1 response each = 8 responses total)	-	1	5	2	-	-
How much did you gain in personal skills as a result of your most recent research experience? (8 related questions x 1 response each = 8 responses total)	-	-	-	8	-	-
How much did you gain in scientific skills as a result of your most recent research experience? (13 related questions x 1 response each = 13 responses total)	-	1	7	1	-	4
Combined Gains	**-**	**2**	**12**	**11**	**-**	**4**
Questions related to the experience	**Not Applicable**	**Poor**	**Fair**	**Good**	**Excellent**	**No Answer**
My working relationship with my research mentor	-	-	-	-	1	-
My working relationship with research group mentors	-	-	-	1		-
The amount of time I spent doing meaningful research	-	-	-	-	1	-
The amount of time spent with my research mentor	-	-	-	-	1	-
The advice my mentor provided me with about careers or graduate school	-	-	-	-	1	-
The research experience overall	-	-	-	-	1	-
Combined Experience	**-**	**-**	**-**	**1**	**5**	-
Questions related to outcomes from the experience	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**No Answer**
My experience prepared me for advanced coursework	-	-	-	1	-	-
My experience prepared me for transfer to a 4-year school	-	-	-	1	-	-
My experience has prepared me for a job	-	-	-		1	-
Combined Outcomes	**-**	**-**	**-**	**2**	**1**	**-**
Questions related to satisfaction with the experience	**Very Dissatisfied**	**Somewhat Dissatisfied**	**Somewhat Satisfied**	**Very Satisfied**	**No Answer**	
The application process	-	-	1	-	-	
Lab or field equipment	-	-	-	1	-	
Support and guidance from faculty	-	-	-	1	-	
Support and guidance from my research mentor	-	-	-	1	-	
Support and guidance from other research group members	-	-	-	1	-	
Financial Support	-	-	-	1	-	
Combined Satisfaction	**-**	**-**	**1**	**5**	-	

Other outcomes resulting from the summer research experience include one student receiving a job offer to stay on at her lab as a part-time research technician. Her mentor has since submitted a manuscript containing work performed by the student and, if accepted, the student will have her name on a peer-reviewed publication.

Of the four students who participated in summer research in 2013:

- One transferred as a biology major to a four-year institution with plans to become a cardiologist
- One has been accepted into the Nursing program at Massasoit
- One will graduate from Massasoit in Spring 2013 and is considering transfer to a four-year school

- One has revised her academic goals from Nursing to Science and is in the process of applying to four-year schools for transfer after graduation from Massasoit in Spring 2013

One hundred percent of the research mentors responded to a post-internship survey for each of the four students supervised. Their overall impressions of the interns were positive, all plan to stay in touch with their interns, and would be somewhat or highly likely to recommend their interns for a job and to mentor another intern from Massasoit. Table 5 collates mentor responses to the evaluation. Comments on the internship experience include, "*Just great! See you next year!*" and "*The intern was polite and worked well with the other lab members.*"

Table 5. Mentor Evaluation Results

Questions related to the Intern's performance	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Answer
The intern was competent	-	-	-	1	3	-
The intern was reliable and responsible	-	-	-	2	2	-
The quality of the intern's work met or exceeded expectations	-	-	-	2	2	-
The intern completed most if not all tasks in a timely manner	-	-	-	2	2	-
Combined Quality	-	-	-	**7**	**9**	-
Questions related to how challenged the intern was	**Not Challenged**	**Somewhat Challenged**	**Very Challenged**	**N/A**	**No Answer**	
Independent work	-	**4**	-	-	-	
Completion of routine tasks and assignments	-	4	-	-	-	
Helping to develop new experiments or work projects	1	2	1	-	-	
Combined Challenges	**1**	**10**	**1**	-	-	
Questions related to the mentor role	**Definitely/ Highly likely**	**Most likely/ Somewhat likely**	**Probably Not/ Somewhat unlikely**	**Definitely Not/ Highly Unlikely**	**No Answer**	
Do you plan to stay in contact with your intern	3	1	-	-	-	
How likely are you to recommend your intern for an entry-level laboratory position	3	1	-	-	-	
How likely would you be to mentor another Massasoit intern or recommend a colleague as a mentor	3	1	-	-	-	
Combined Mentor	**9**	**3**	-	-	-	

C. Inquiry-based Learning

To help more students to experience the benefits of participating in undergraduate research, the Biotechnology program is emphasizing the use of research-based learning in the classroom. The new courses and a redesigned Chemistry course are including open-ended labs, where the results are uncertain, that will help students to gain the experience of scientific work. Students will participate in all aspects of scientific investigation, including identification of a question, development of an experimental approach to address the question, construction and implementation of the experiment, assembly and reduction of the data results, interpretation of the results, and reporting of the results.

The PI and Co-PIs are working with James Hewlett, Executive Director and PI of the NSF-funded Community College Undergraduate Research Initiative, to incorporate undergraduate research across the division. Mr. Hewlett spent a day on campus with the Co-PIs in November to present a workshop on the CCURI model for incorporating research on a community college campus and to help the team to

think about how to implement a program at Massasoit. Each of the four Co-PIs completed an evaluation survey adapted from the workshop survey used by CCURI. The meeting was also observed by adjunct Biology faculty Dr. Truong-Bolduc, the chair of the Evaluation Team, and the Associate Dean of Grants and Sustainability. None of the observers participated in the evaluation survey.

The Co-PIs reported a positive opinion as to the usefulness of the workshop but gave it very mixed reviews overall. While answers to specific questions indicate that participants did gain knowledge to inform their ultimate goal of embedding research into curriculum and on campus, it is clear that there is some doubt about how to progress and that some reservations exist among the Co-PIs.

The cost of purchasing equipment, high faculty teaching loads, and difficulty recruiting students were seen as potential barriers to the project's success by 75% or more of the respondents. Ultimately, one Co-PI member was mostly confident that a research program will be successfully implemented, and the other three were only partially confident. Other specific comments resulting from the workshop include:

- *"One big concern is to get other faculty involved. There are some faculty that are interested, but feel they do not have the time due to their teaching load. One person will have to take the lead and show how it is done."*
- *"CCURI has offered to help us make connections with other community colleges that have undergraduate research. This is a tremendous help. These connections can help us design acceptable research questions that are reasonable for our students to work on."*
- *"We all agreed that we should find one or two projects that students from different courses can participate in. We outlined a rough plan and I will follow up in a Division Meeting to promote the idea of research in the classroom. The meeting was great to help put our thoughts and current practices in perspective as to where we want to go with this."*

Table 6. Evaluation Responses to the CCURI Workshop

	Highly Useful	**Pretty Useful**	**Somewhat Useful**	**Not Very Useful**	**Not Useful at All**
How useful was the workshop in helping to implement a research program at Massasoit?	1	2	1	-	-
	5 Excellent	**4**	**3**	**2**	**1 Poor**
How would you rate the workshop overall?	1	-	2	1	-
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
This workshop provided the tools and resources to implement a research program at Massasoit	-	1	3	-	-
My team developed a workable action plan at the workshop	-	3	1	-	-
I am clear about the steps necessary to implement my team's action plan	-	1	3	-	-
The workshop provided enough information to make my team's brainstorming session productive	1	3	-	-	-
	Completely Confident	**Mostly Confident**	**Partially Confident**	**Not Very Confident**	**Not Confident at All**
How confident are you that Massasoit will successfully implement a research program?		1	3	-	-

In addition to the workshop around a campus-based research program, the two new courses introduced through this grant have labs that are based in open-ended questions rather than traditional “cookbook” labs where students replicate a process with expected results. One course was piloted this fall. Student evaluations for this course are referenced in Section 3A, above.

Additionally, General Chemistry II has also been revised to include inquiry-based labs and was piloted in fall 2012. This is also a required course for the biotechnology certificate and degree option.

IV. Recommendations

Based on the findings from this evaluation, the following recommendations have been identified for Massasoit Community College's Pipelines project by the evaluation team.

A. Biotechnology Degree Option and Certificate Program

Students who have enrolled in the Biotechnology certificate program as a stand-alone or add-on to the Liberal Arts Transfer – Science degree are drawn from a highly diverse population, with 75% female and 50% minority representation. Student evaluations on the new Topics in Microbiology Course ranged from excellent to good in all areas.

- While the diversity of enrollment is commendable, the project needs to draw more students into the biotechnology program. With over 1,000 declared LATS majors at the college, eight unique students represents less than 1% of science majors. Further, all three of the new courses created for the certificate/degree option are not fully enrolled in the first year. This is a missed opportunity for LATS students who may not be aware of this new academic option, but who could benefit from both the credential and the coursework. More and more effective means of promoting the value of this program and advising students into it should be introduced at the college, both in and outside the department.

B. Summer Research/Internships

Student participation in summer research and grant-funded internships was highly diverse, with 75% female and 75% minority student participation. Mentors were less diverse with only one of three being either female or minority. While student outcomes from the experience were positive – with two of the four transferring to four-year schools and one receiving a job offer at the internship site – only one student completed the post-experience survey, so student feedback is lacking. Mentor feedback on the experience was 100% and was universally positive.

- The pool for research internship candidates was limited to four applicants – one for each spot available. Massasoit needs to do a better job of announcing these opportunities and encouraging greater participation in these experiences so that a wider pool of qualified candidates is able to compete for this valuable work experience. Massasoit has established relationships with industry partners who host interns or promote internships, so candidates that are not selected for the grant-funded spots can be encouraged to apply for other opportunities.
- To encourage greater response to the student internship survey, it is recommended that in future years, student researchers be asked to complete the evaluation late in, but prior to, the close of the research experience.
- Massasoit should continue to actively pursue opportunities for students to intern at partner labs and on campus in addition to the grant-funded opportunities, and seek to add mentors who are drawn from underrepresented populations in the sciences to provide role models who are reflective of students' own backgrounds.

C. Inquiry-based Learning

A workshop for the Co-PIs that was held in November addressed building a research culture on campus through the incorporation of genuine research into curriculum. The workshop received mixed reviews, with most concerns from Co-PIs centering on how to progress and how to get more buy-in for the project from other faculty and the institution. Both new courses developed through this project do include inquiry-based labs, and industry partnerships have expanded.

- Following on this informative workshop, the project needs to build on its momentum with the Co- PIs to get an implementation plan underway. Given the relatively low confidence by the Co-PIs concerning fully implementing a genuine research program, the team needs to find ways to address the concerns expressed following the workshop and to get more faculty involved.
- The Co-PIs need to revisit the project plan to introduce more inquiry-based learning into curriculum in lieu of genuine research. Co-PIs should schedule a debriefing at the end of this semester to compare experiences with this methodology to date, and to discuss best practices that can be used to make revisions to current courses and modeled for other faculty in Years 2 and 3 of the grant.
- More industry partners need to be established to broaden the opportunities for internships in various types of sites, and to diversify student exposure to career paths in the Biotechnology sectors.

V. Appendices

A. Topics in Molecular Biology Syllabus

B. Cellular Biology Syllabus

C. Seminar in Biotechnology Syllabus

D. Student Research Experience Complete Survey Results

E. Research Mentor Experience Complete Survey Results

F. CCURI Workshop Complete Survey Results

Appendix A. Topics in Molecular Biology Syllabus

MASSASOIT COMMUNITY COLLEGE

Section 01 MW **09/05/2012 - 12/22/2012**

9:00AM – 11:50 AM **S534**

Course Description

This laboratory-intensive course will provide students with techniques in DNA manipulation not covered in Cellular Biology (i.e. emphasis will be on bacterial and viral genetics). The course's experimental theme-based approach will place students in the role of a technician/research assistant. They will make reagents, follow SOPs, perform experiments, keep a notebook, and analyze data in the forms of tables and graphs. This course is intended for students intending on transferring into bachelor's programs in biology, chemistry or biochemistry, or those interested in pursuing careers in biotechnology or pharmacy.

Course Prerequisites:

Preparing for College Reading II (ENGL 092), Introductory Writing (ENGL 099), and Fundamentals of Mathematics (MATH 010); waiver by placement testing results; or departmental approval.

Instructor Information

Gilles Bolduc, Ph.D.

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Biology Department
Massasoit Community College

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Science Building; **S-323**
Brockton, MA 02302

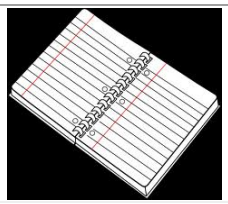
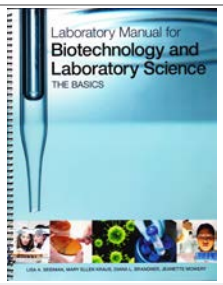
Phone: 508-588-9100 ext. 1617

Email: gbolduc@massasoit.edu

Office Hours:

Mon. and Wed.	1:00 PM – 2:00 PM
Tues. and Thurs.	2:00 PM – 3:00 PM

Required Course Materials

	Spiral Notebook for lecture notes. Available at most stores.
	Laboratory Manual for Biotechnology and Laboratory Science The Basics Author: Lisa A. SEIDMAN Edition:11 Publisher:PEARSON ISBN: 9780321644022 Available at the Bookstore: Lab Manual for $66.20 (NEW)
	Composition Book (lab notebook) Available at most stores for approx. $1.00. Do not buy the 6 subject notebook. You will not need the extra pages.
	Lab Coat image: http://www.bahamasembroidery.com/image2.html Available at any uniform stores.(approx. $35.00) Also, students may want to check out the lab coats left behind by previous students. They will need laundering, but THEY ARE FREE!!!
Computer access	Adobe Reader for PDF files , FLashplayer

Online Readings

- Additional links to various web sites will be provided through out the course. These sites may require Quick Time Player, Windows Media Player, Adobe Reader, or similar software.

Course Structure & Grading Criteria

Weekly Structure

Students will be placed in the role of a technician/research assistant. They will make reagents, follow SOPs, design and perform experiments, keep a notebook, and analyze (this may be in the form of a table or graph) data. Discussions will include best methods to present data. Students will use Microsoft office programs (Word, Excel, PowerPoint). Additionally, they will analyze data using web-based software and give a PowerPoint presentation summarizing their results.

Assigned readings, learning activities, discussions, and/or assessments will have specific due dates assigned to them within the weekly modules (in Canvas). All assignments must be completed within the assigned timeframe. **Late assignments will not be accepted**. For example, if an assignment is due on Friday, you have until 11:59 pm of that evening to submit the assignment through **Canvas LMS**. **Late assignments will be given the grade of 0**.

Lectures

Lectures will cover material needed to understand the basis of basic molecular biology techniques used in the lab.

Homework (HW) Assignments - 10 percent of final grade
Weekly learning activities will be assigned (posted on Canvas LMS) and may include external readings, virtual laboratory experiments, interactive web-based learning modules, or video clips. These activities are included to enhance the materials covered in the lectures. Homework assignments will consist of answering a series of questions based on the assigned material. The homework assignments (HW) account for 10 percent of the final grade. Each homework will be graded on a scale of 0 to 10. **LATE homework will receive 0 points.** The HW grades will be averaged together and applied to the student's final grade.

As an example, if a student's HWs average is 8 points, then that student has earned 8 points towards his/her final grade.

Lecture Exams - 10 percent of final grade each - (30 percent total)
Three lecture exams are scheduled during the semester (see the Tentative Course Outline for specific dates). These exams may consist of multiple choice, matching, fill-in, short answer and data interpretation questions. **There will be no make-up lecture exams. If the student is unable to attend class during a scheduled exam, he/she must make arrangements with the instructor before the exam time.** If a student misses one exam, the grade he/she earns on his/her final exam will be the same grade assigned to that ONE missed exam. If the student misses more than one exam, a grade of 0 will be given to the additional missed exams.

Final Cumulative Exam - 10 percent of total grade
A **cumulative** final exam is scheduled for **Wednesday, December 19, 2012** in **S-534; from 8:00 AM – 10:00 AM.** The material will include everything covered during the semester. The format will be multiple-choice and matching. Students must sit for the final exam at this time.

Laboratories

Laboratory Notebook Entries - 20 percent of final grade.

An emphasis will be placed on industry-standard notebook documentation. Students will learn how to properly record the purpose of each experiment, the materials used, the actual procedure they performed, their results and conclusions.

Lab notebooks will be collected at different times during the semester to help offer constructive criticisms on how to improve the quality of the entries. Students will receive a final grade on their notebook at the end of the semester. This grade will be based on the effective usage of:

- Table of Contents
- Experimental Titles
- Purpose of procedure
- Procedures
- Observations
- Conclusions
- Dates
- Proper labels
- Page numbers
- Interpretable drawings/tables
- Record of Total Magnification when making microscopic observations
- Neatness

Each of these categories will be scored on the scale of 0 – 20 as described below. These scores will be averaged to calculate the final reported grade. N**otebooks handed in late will have points deducted based on tardiness.**

0	1-4	5-8	9-12	13-16	17-20
Missing	poor	OK	good	very good	excellent

Laboratory Practical Exams - 10 percent each (30 percent total towards final grade)
Three laboratory practical exams are scheduled during the semester (see the Tentative Course Outline). These exams are meant to test the students for their understanding of the material covered in the laboratory. The format will be short answers, fill-in the blanks, multiple choice, and problem solving questions. **There will be no make-up practical exams. If the student is unable to attend class during a scheduled exam, he/she must make arrangements with the instructor before the exam time.**

NOTE: the materials covered in each lab practical are tentative and subject to change to reflect the actual material covered in lab. Changes will be announced in class and posted on Canvas.

Course Grade Distribution:

Lecture		**Laboratory**	
Exam I	10 %	Lab Practical I	10 %
Exam II	10 %	Lab Practical II	10 %
Exam III	10 %	Lab Practical III	10 %
Final Exam	10 %	Lab Notebook Entries	20 %
Homeworks (HW)	10 %		
Total	50 %	Total	50 %

Grading Scale					
A	≥ 92.5	**B-**	79.5 to 82.4	**D+**	66.5 to 69.4
A-	89.5 to 92.4	**C+**	76.5 to 79.4	**D**	62.5 to 66.4
B+	86.5 to 89.4	**C**	72.5 to 76.4	**D-**	59.5 to 62.4
B	82.5 to 86.4	**C-**	69.5 to 72.4	**F**	≤ 59.5

Tentative Course Outline:

Week	Dates	Topics	Homework assignments
1	9/5/12 Wed	Introduction to the course Notebook Taking, pp. 48 - 66	
2	9/10/12 Mon	Lab Safety Overview of Cloning and Sequencing Lab – Part I Proper Controls Equipment to be used Design setup	HW1: Understanding the chemicals with which you work, pp. 16 - 21
	9/12/12 Wed	Cloning and Sequencing Lab – 2	
3	9/17/12 Mon	Cloning and Sequencing Lab – 3 Send DNA for sequencing	
	9/19/12 Wed	Lab Practical I Notebooks – students will critique each others' notebooks Competet E. coli - overview	
4	9/24/12 Mon	Competent E. coli – Buffers / media Calcium chloride LB agar with and without antibiotics	HW2: Write an SOP, pp. 66-69.
	9/26/12 Wed	Competent E. coli – experiment and freeze at -80C	
5	10/1/12 Mon	Extract Genomic and Expression plasmid DNA Restriction Digests – overview	
	10/3/12 Wed	Exam I	
6	10/8/12 Mon	NO CLASSES – Columbus Day	HW3: Measurements
	10/10/12 Wed	DNA analysis – concentration / nanodrop Primer design Setup RE digests	

7	10/15/12	Mon	DNA RE digests and purification – BioRad Freeze N' Squeeze PCR amplification of selected gene from chromosomal DNA	
	10/17/12	Wed	Ligate into pCR2.1TOPO Transform into TOP10 E. coli Plate on LB, LB+Amp, or LB+Kan	
8	10/22/12	Mon	Lab Practical II Select transformants – replica plate Grow transformants in LB+Amp or LB+Kan	HW4: Aseptic Technique on an open lab bench, pp. 310 – 316.
	10/24/12	Wed	Isolate transformed plasmid – Qiagen mini preps RE digest Gel electrophoresis	
9	10/29/12	Mon	Gel purify inserted genes – Freeze N' Squeeze Ligate O/N in expression vector from week 5	
	10/31/12	Wed	Transform new plasmid constructs into BL21 or BL21(DE3) Plate on LB, LB+Amp or LB+Kan	
10	11/5/12	Mon	Exam II Select transformants – replica plate Grow transformants in LB+Amp or LB+Kan	HW5: Spectrophotometer: absorbance, pp. 126 – 147.
	11/7/12	Wed	Analyze GAPDH sequences from week 3 Isolate plasmid DNA – Qiagen mini preps RE digest – gel electrophoresis	
11	11/12/12	Mon	Veterans Day – No Classes	
	11/14/12	Wed	Select two good transformants for sequence analysis	

12	11/19/12	Mon	Shake flask cultures Protein expression time course	HW6: Micropipet verification, pp. 108 – 111.
	11/21/12	Wed	Lab Practical III Novagen - BugBuster® Protein Extraction	
13	11/26/12	Mon	His-Tag column purification	
	11/28/12	Wed	Protein Dialysis	
14	12/3/12	Mon	Protein prep concentration - Centricon	HW7: pH meter calibration
	12/5/12	Wed	Exam III	
15	12/10/12	Mon	Update Notebook entries	
	12/12/12	Wed	Clean up lab	
	12/19/12	Wed	Final Exam at 8:00 am in S534	

Teaching Procedures

Students are expected to actively participate in the discussion of the topics assigned in both lecture and lab. The student should spend a minimum of two hours preparing for each class by pre-reading the assigned pages from the text and laboratory exercises. Class discussion will be augmented by use of Powerpoint, handouts, animations and in-class activities.

During laboratory sessions students will work individually and occasionally in small groups to complete the assigned tasks. The student should carefully read over each procedure before coming to lab. The instructor will demonstrate all new procedures. S**tudents will learn new techniques and work on projects independently. Often students must spend extra time in the lab to acquire the new skills.**

Students are encouraged to meet frequently with the instructor for additional help with understanding lecture or laboratory information, study skills, test taking skills, and writing skills. My office hours are posted outside my office door and listed in the syllabus under: Instructor Information. If these hours are not convenient, please see me about scheduling an appointment.

Course Policies

Attendance:

The student is expected to attend all lecture and laboratory sessions. Attendance will be taken daily by passing around an attendance sheet. If you arrive late to class make sure that you see the instructor at the end of class. If you are not going to be able to attend class or lab, please leave a message on my voice mail or send me an email message. It is the student's responsibility to get copies of lecture notes, handouts, and assignments for days missed. **Please remember that missed exams and quizzes may not be made up.**

Students are allowed to have their cell phones in class. However, **they must be on the silence mode at all times.** Please leave the classroom if you need to answer the call. **At no time should you be texting during class and lab periods.** If you must text someone, you should leave the classroom to do so.

College Policies and Procedures

Basic Computer Skills

Basic computer skills are required for online classes. These skills include sending and receiving email, word processing, cutting and pasting within documents, toggling between applications and using email attachments. In specialized courses, other skills may be required.

Email

In accordance with the Computer Literacy Skills Matrix adopted by the Massasoit Community College community in April of 2009, it is expected that all members of the college community use email to:

1. communicate within and across organizations, and
2. use email to share files and documents

Netiquette – PRACTICAL GUIDELINES WHILE ONLINE

The following guidelines have been adapted with the permission of Bristol Community College (from their Responsible Use Policy). Please refer to the College's Policy for the Responsible Use of Information Technology for acceptable uses of technology on campus.

Be Lawful

- Do not send messages or comments that are threatening, harassing, or offensive in any way. Please remember that any of your comments may be misinterpreted!
- Be sure all quotes and sources are properly credited. Respect all copyrighted materials.
- Do not pretend that you are someone else.

Be Courteous

- Be courteous and professional with your communications. Do not convey a hostile or confrontational tone when communicating or working collaboratively with other students.
- Do not be confrontational for the sake of it. Although "flaming" (a critical verbal attack) is not uncommon on the Internet, it is inappropriate in a college online environment.
- Express differences of opinion in a polite and rational way.
- Maintain an environment of constructive criticism when commenting on the work of other students.
- Be tolerant and patient with all users.

Show Respect

- Do not publicize personal matters through the online course site where your class resides unless appropriate to the course.
- Using profanity in your email or discussions is unacceptable while using the Bristol Community College network and its online course sites.
- Do not redistribute private email sent to you without first asking the originator's permission.

Be Specific

- Focus on one subject per email or discussion and put a title in the subject box that clearly indicates what your message is about.
- "Sign" your emails and discussion postings. Email addresses do not always indicate the name or email address of the sender.

Use Appropriate Language

- If you think you are too emotional, don’t send the message; save it, and review it later. Please remember that no one can guess your mood or see your facial expressions. They are basing the communication on your words, and your words can express the opposite of what you feel.
- Use sarcasm and humor with care. They are easily misunderstood in writing. To let people know you are being humorous, you can use this sideways happy face :-)
- Do not use ALL CAPITAL LETTERS – it’s considered shouting!

Make a Good Impression

- Your words and content represent you; review and edit your words and images before sending.
- Make an effort to spell words correctly and use correct grammar. You will make a better impression on the recipients.

Be Brief

- Unless your instructor or fellow students have asked you to send a lengthy message or assignment, keep your emails and discussion postings short and to the point.
- If your message is short, people will be more likely to read it.

Be Aware

- Please remember that email can be forwarded to other people without your permission.
- The Internet in general is not a secure form of communication.

Massasoit Community College Acceptable Use Policy

The college adheres to an Acceptable Use Policy regarding all technology use.

Statement on Academic Honesty

In accepting admission to Massasoit Community College, students also accept the responsibility for maintaining high standards of academic integrity and scholarly practice. Plagiarism - using another person's words or ideas without acknowledgement - is strictly forbidden. This means that dependence on the ideas or language of others in a student's oral, written, technical and artistic work must be properly acknowledged and documented. Information on documentation is contained in most writing handbooks and is generally covered by an instructor in one of a student's composition courses.
Academic dishonesty also includes but is not limited to a student's giving or receiving aid during examinations or in completing laboratory assignments, computer programs, or other work assigned in courses, unless given explicit permission by the instructor.
It is the responsibility of the individual instructor to enforce this policy. If an infraction should occur, an instructor may take action which reflects the seriousness of the infraction, and could range from an informal verbal warning to, but not beyond, the issuance of a grade of F for the course.
In addition to action taken relative to the specific course, the course instructor may bring any matter related to academic honesty to the Assistant/Associate Dean, who may bring the matter to the Vice President of Faculty and Instruction for consideration of further disciplinary action.
The student's right to due process is guaranteed in any disciplinary action involving faculty members and the administration. If a student has a complaint or a grievance he/she should contact the Dean of Student Services. The Student Grievance Procedure is contained in the Student Handbook which are available in the Student Life Office and the Office of the Assistant

Dean of Student Services. The procedure outlines the necessary steps a student must follow to file a grievance.

Disability Services

In compliance with the Americans with Disability Act of 1990 and the CH504 of the Rehabilitation Act of 1973, the college offers accommodations to students with documented disabilities. Students need to make an appointment with the disability services providers at the college as soon as possible.

Brockton Campus: 508.588.9100 ext. 1805 or ext. 1425

Canton Campus: 781.821.2222 ext. 2468 or ext. 2515

Technical Support

System Requirements

OIT has begun the process of limiting access onto the College network to authenticated users only. Any computer trying to access the network will be "challenged" to provide an authorized username and password. Failure to provide authentic credentials will cause the machine to be stopped from using the College network.

Members of the Massasoit Online Learning community are strongly encouraged to have access to the following equipment and software while navigating the online classroom environment, sending and receiving assignments and communicating efficiently:

- A PC running Windows, 2000, XP, or Vista (a Pentium or equivalent processor at 500 MHz or better) or a Macintosh system 7.5 or better.
- 128 Mb RAM (128 Mb highly recommended) and at least 50 Mb or available disk space.
- A modem or other device capable of connecting to the Internet at a speed of at least 56 kbps or broadband Internet connection.
- An ISP (Internet Service Provider).
- We highly recommend the use of Firefox browser for online courses for both PCs and Macs. However, Microsoft Internet Explorer 7.0 Service Pack 2 or later (SP2/SP3) for PC users and Safari 4 for Mac users may be compatible.
- Word processing software program.
- Current virus software must be installed and kept up to date.

You will also need to make sure your computer is reliable and updated with all the latest software versions that are necessary to run our current Learning Management System.

Downloads

Adobe Acrobat Reader
RealPlayer
Flash Player

Academic Support

There are a variety of resources at Massasoit Community College to support your online learning experience.

eTutoring

A free onlnie tutoring service available to MCC students

Massasoit Community College Library

The MCC Library site provides access to online databases, Ask A Librarian online, citation information and more.

As with face-to-face courses, if you are experiencing difficulty with your course, the Academic Resource Center (ARC) offers tutoring and academic support services.

ACCOMMODATIONS STATEMENT: Students with disabilities who believe that they may need accommodations in the classroom are encouraged to contact a disability counselor on campus as soon as possible. Students at the Brockton Campus with learning disabilities and all students at the Middleboro Center should contact Andrea Henry, at extension 1805. Students with physical disabilities at the Brockton Campus should contact Mary Berg , at extension 1425. All students at the Canton campus should contact Mary Berg at extension 2132.

Course Outcomes

At the conclusion of the course, you will be able to:

1. Performance of computer-based analysis on DNA/RNA/protein sequences
    - Microsoft Office suite
    - Web-based anaylsis programs
        - NEBCutter
        - NCBI
2. Demonstrate strong mathematic skills
    - Calculate molarities
    - Perform dilutions
3. Perform metric conversions
    - Freely convert between US standard and Metric units
    - Demonstrate abilities to move across the metric prefix conversion table
4. DNA isolation from bacterial cells
    - Demonstrate knowledge for the basis of the procedure
    - Successfully isolate DNA using standard methods
5. Mutation of plasmid DNA
    - Plasmid extraction
    - Restriction enzyme digestion
    - Site-directed mutagenesis
6. Construction of plasmids
    - Cloning vectors
    - Expression vectors
    - Shuttle vectors
7. Transformation of bacterial cells and transfection of eukaryotic cells
    - Electroporation
    - Calcium chloride competent cells
8. Present data
    - PowerPoint presentation
    - Poster presentation
9. Read SOPs
10. Notebook entries using Industry Standards
11. Literature Search
12. Use of Controls
13. Data interpretation

Appendix B. Cellular Biology Syllabus

Massasoit Community College

BIO-234-01, Spring 2013 ***CELL BIOLOGY*** **COURSE SYLLABUS**

Instructor: Gordon C. Yaney, Ph.D.

Contact Info: Email gyaney@massasoit.edu
Phone: 508-588-9100, x1602
Office: S-323
Lecture / Lab: S-534

Office Hours: MWF 11:00am - noon, T 3:30 – 4:30PM or by appointment

Class Schedule: TR 9:30 am – 12:15 pm

Required Textbook: Alberts, B. *et al.,* (2009) ***Essential Cell Biology,*** *3rd* edition, Garland Science, NY

Final Exam: May 7 at 8am in S-534

BIO 234 Course Description:
This course provides an overview of eukaryotic cell structure and function.

Topics will include: review of chemical components of the cell, protein structure & function, DNA /chromosome structure & function, gene expression and its control, mechanisms of protein processing, vesicular transport, intercellular and intracellular communication; cell cycle regulation.

Prerequisite: BIOL121 - Biological Principles I

Course Objectives:
After completing Cell biology, you should be able to:
□ Relate the structures, functions, and locations of the four macromolecules within cells
□ Explain the Central Dogma of Biology and describe the three processes involved
□ Describe the processes by which proteins fold and are regulated
□ Describe the molecules, receptors, and intracellular pathways involved in cell signaling
□ Compare and contrast the distinguishing characteristics of prokaryotic and eukaryotic cells and their processes
□ Provide the location and function of each of the major organelles and/or macromolecular structures of prokaryotic and eukaryotic cells
□ Provide roles of ER, Golgi, and lysosomes in protein modification, sorting, transport, and degradation
□ Describe the location, structure, and role of the cytoskeleton
□ Describe stages of cell cycle and regulation of it
□ Describe laboratory techniques demonstrating link between genotype and phenotype, test the role of the cytoskelaton in exocytosis and phagocytosis.
□ Describe the basic steps in the use of a laminar air-flow hoods & the culture of eukaryotic cells
□ Describe the function and regulation of the pancreatic β-cell as a model of metabolic & ionic cell signaling, protein synthesis and sorting as well as Ca^{2+}-dependent exocytosis.

Tentative Schedule / S-534

Lecture #	Week	Date	Chapter Exams		Lab Material
1, 2	**1**	**1/22 & 24**	**1, 2**		**1. Basic Techniques** *keeping a notebook*
3, 4	**2**	**1/29 & 31**	**2/4**		writing *scientific paper* *use of micropipettes / balance*
5, 6	**3**	**2/5 & 7**	**4**		*common solutions*
7, 8	**4**	**2/12 & 14**	**5/6**	**Exam I** *(1, 2, 4)*	**2. Biology's Central Dogma**
9, 10	**5**	**2/19 & 21**	**7**		*pGLO Transformation (3 days)* *transformation efficiency (1 day)*
11, 12	**6**	**2/26 & 28**	**8**		*GFP chromatography (4 days)*
13, 14	**7**	**3/5 & 7**	**8**		
15, 16	**8**	**3/12 & 14**	**11/12**	**Exam II** *(5, 6, 7, 8)*	
-------	**9**	**Spring Break (3/19 & 21)**			
17, 18	**10**	**3/26 & 28**	**15**		**3. Phagocytosis & Exocytosis** *Tetrahynema I / Dyes alone*
19, 20	**11**	**4/2 & 4**	**15**		*Tetrahymena II / inhibitors*
21, 22	**12**	**4/9 & 11**	**16**	**Exam III** *(11, 12, 15)*	**4. β-cell as a Model System** *plating of cells*
23, 24	**13**	**4/16 & 18**	**16**		*Glucose-Stimulated Insulin Secretion* *GSIS ± inhibitors*
25, 26	**14**	**4/23 & 25**	**17**		
27, 28	**15**	**4/30 & 5/2**	**18**	**Exam IV** *(16, 17)*	

Final Exam will be May 7 at 8am. Exam will be cumulative, but will include some new material from Chapter 18.

Unless otherwise noted, reading assignments are from the course's textbook, *Essential Cell Biology, 3rd edition*.

This is a ***tentative*** schedule. Topics will be followed in this sequential order but the pace of material may not fit perfectly with the schedule.

Assignment of Grades:

The final course average will be based on the average of all course work. Final course averages will be rounded to the nearest whole number. Averages ending in .49 or lower will be rounded down while averages ending in .50 or higher will be rounded up. Letter grades will be assigned based on the scale below.

A	93.5 and above	A-	89.5 to 93.4		
B+	86.5 to 89.4	B	82.5 to 86.4	B-	79.5 to 82.4
C+	76.5 to 79.5	C	72.5 to 76.4	C-	69.5 to 72.4
D+	66.5 to 69.4	D	62.5 to 66.4	D-	59.5 to 62.4
F	Below 59.5				

Course Grade:

Exams (15% per exam)	45%
Final Exam	15%
Quizzes (4% per quiz)	10%
Lab	30%
Total	100%

In Class Exams and Final Exam:

Four in class exams will be given consisting of a combination of fill-ins, multiple choice, true or false, matching, short answer questions, filling in figures or tables, and short essays. A study guide for each exam will be provided prior to the exam.

The final exam will be a cumulative exam and is scheduled for **May 7 at 8AM. The final exam is worth 15% of your course grade.**

If you did your math, you will notice that there are 4 in-class exams each worth 15% that add up to 60% instead of 45% as listed above. Your lowest in class exam grade will be dropped and your three highest exam grades will be used to calculate your overall exam grade.

Quizzes:

Four in class quizzes will be given. Quizzes will be given during the first 15 minutes of lecture. The quizzes will consist mostly of multiple choice or true / false questions.

Excused Absences from Quiz or Exam:

An excused absence from an exam will only be granted under exceptional (i.e. extreme illness or a death in your immediate family) **and** documented (i.e. doctor's note) circumstances. Unlike scheduled exams, make-up exams will consist of essays only. Most students find the make-ups more difficult than the original exams. Make-ups for the final exam require the signature of the Dean and are arranged through the Dean's office.

Attendance, Punctuality and Courtesy:

Students are expected to attend all lecture and laboratory sessions and are responsible for all information covered during this time. Lecture PowerPoint slides will be available on eLearn, but students will be responsible for obtaining class notes from a friend. Late arrivals can be disruptive to the class and distract students focused on a quiz or session. If you are late, please quietly find a seat at the back of the room. Cell phones must be turned off during class and lab and text messaging is not permitted.

Statement on Academic Honesty

In accepting admission to Massasoit Community College, students also accept the responsibility for maintaining high standards of academic integrity and scholarly practice. **Plagiarism** - using another person's words or ideas without acknowledgement - is strictly forbidden. This means that dependence on the ideas or language of others in a student's oral, written, technical and artistic work must be properly acknowledged and documented. Information on documentation is contained in most writing handbooks and is generally covered by an instructor in one of a student's composition courses.

Academic dishonesty also includes but is not limited to a student's giving or receiving aid during examinations or in completing laboratory assignments, computer programs, or other work assigned in courses, unless given explicit permission by the instructor.
It is the responsibility of the individual instructor to enforce this policy. If an infraction should occur, an instructor may take action that reflects the seriousness of the infraction, and could range from an informal verbal warning to, but not beyond, the issuance of a grade of F for the course.

In addition to action taken relative to the specific course, the course instructor may bring any matter related to academic honesty to the Assistant/Associate Dean, who may bring the matter to the Vice President of Faculty and Instruction for consideration of further disciplinary action. The student's right to due process is guaranteed in any disciplinary action involving faculty members and the administration. If a student has a complaint or a grievance he/she should contact the Dean of Student Services. The Student Grievance Procedure is contained in the Student Handbook which are available in the Student Life Office and the Office of the Assistant Dean of Student Services. The procedure outlines the necessary steps a student must follow to file a grievance.

Accommodations Statement

Students with disabilities who believe that they need accommodations in the classroom are encouraged to contact a disability counselor on campus as soon as possible. Students at the Brockton Campus with learning disabilities and all students at the Middleborough Center should contact Andrea Henry at extension 1805. Students with physical disabilities at the Brockton Campus should contact Mary Berg, at extension 1425. All students at the Canton Campus should contact Mary Berg, at extension 2132.

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Canton Campus: 781.821.2222 ext. 2468 or ext. 2515

How to Get the Most Out of the Course

- Lecture
  - PowerPoint presentations
    - Posted online at course Canvas site
  - Read for lecture
    - Before, after, or both!
  - If you do not understand a topic covered in lecture…
    - Ask a question.
      - You may not be the only one with this question!
    - Stop by my office.
      - Less intimidating for some people.
      - Often easier to explain one on one.
- Studying Tips
  - Stay on top of the material!
  - Use your notes!
    - Class notes **&** notes from the readings
  - Try to put the material together so it tells a story.
    - Easier to remember a story than bits and pieces.
      - Ask yourself questions to help put the story together
        - What is the purpose?
        - When is it done?
        - By whom is it done?
        - Who are the key players?
  - Try problems in text that correspond to lecture material
  - Don't keep reading your notes over and over!
    - Get a blank sheet of paper out and see what you know!

LABORATORY Room S534

Requirements: Each student should have a separate, **bound** laboratory notebook for recording laboratory results, a lab coat and binder for handouts.

Lab sessions have been designed to introduce you to techniques commonly used in cell biology laboratories. Attendance is mandatory. If you know in advance that you will be unable to attend a lab, contact your lab instructor at least one week in advance to make arrangements to come to a different lab session. However once a lab is missed, you cannot make it up at a later date.

Your lab grade will be based on the following: keeping a lab notebook in good standard form, quizzes on both the practical and conceptual points discussed in lab, student write up of one lab exercise in the form of a scientific paper and a brief oral presentation of it.

Each of these lab components will be calculated as part of your overall class grade:

Lab Notebook	**40%**
Quizzes	**20%**
Lab Paper	**20%**
Oral Presentation of lab work	**20%**
Total	**100% (30% of course grade)**

Tentative Schedule of Lab Topics

UNIT 1 / Some Basic Skills

1. Keeping a Laboratory Notebook / handout (1/24)
2. Writing a Scientific Paper / handout (1/29)
3. Common Types of Solution / Dilutions / handout & homework (1/31)
4. Proper Use of Micropipettes / exercises (2/5, 2/7)

UNIT 2 / Illustration of Biology's Central Dogma: DNA to RNA to Protein

1. Transformation of E. coli / calculation of transformation efficiency (2/19 – 2/28)
2. Green Fluorescent Protein (GFP) purification via column chromatography (3/5 – 3/7)

UNIT 3 / Phagocytosis & Exocytosis in a simple protozoa

1. Microscopic-based assay using dyes (India Ink & Carmine Red) (3/26 – 3/28)
2. Testing of inhibitors that inhibit the function of the cytoskeleton (4/2 – 4/4)
   Question: How will disruption of actin filaments or microtubules affect these processes?

UNIT 4 / Use of clonal pancreatic β-cells to study cell signaling & exocytosis

1. Plating of β-cells (4/9 – 4/11)
2. Stimulation by extracellular glucose ± inhibitors (4/16 – 4/18)
   Collection of extracellular insulin & storage
3. ELISA: measurement of released insulin (4 /25)
   Question: What will inhibitors used in Unit 3 affect glucose stimulation?

Appendix C. Seminar in Biotechnology Syllabus

Section 01 Mon. 9:00 AM – 9:50 AM S534 01/28/2013 - 05/06/2013

Course Description

Students enrolled in the Biotechnology Certificate are required to register for this course. Includes attendance at the monthly LATS seminar series, resume writing and mock interview workshop, safety in biotechnology research workshop, site visit(s) to nearby life science companies, and potential job-shadowing and internship opportunities. Provides students the opportunity to meet representatives from local biotech companies, research potential internship sites, and educate themselves on how to obtain employment following graduation from Massasoit, while assessing if a position as a research technician assistant is their career goal.

Prerequisites: C- or higher in BIOL 121 Biological Principles I or successful performance on departmental challenge exam, ENGL 092 Preparing for College Reading II, ENGL 099 Introductory Writing, MATH 112 Intermediate Algebra or higher; waiver by placement testing results; or departmental approval.

Instructor Information
Gilles Bolduc, Ph.D.
Associate Professor
Biology Department

Massasoit Community College
1 Massasoit Boulevard
Science Building; **S-106**
Brockton, MA 02302

Phone: 508-588-9100; ext. 1617
Email: gbolduc@massasoit.edu

Office Hours:

Mon. and Wed.	11:00 am – 12:00 noon
Tues. and Thurs.	2:00 pm – 3:00 pm

Teaching Procedures

This course will consist of guest speakers from Life Science industries. The speakers will share their experiences in their fields at which time students will be encouraged to ask questions. In addition, students will prepare a resume and cover letter and apply for an internship position. Students will set up a LinkedIn account to begin working on their professional profile. Student attendance in this seminar as well as at Friday LATS seminars will count towards student grades.

Seminar Outcomes

- Attendance at monthly LATS seminars
- Participation in the resume writing workshop Development and submission of an up-to-date resume
- Participation in mock interview workshop(s)
- Participation in at least one biotechnology company site-visit
- Research potential internship sites

.

Course Structure & Grading Criteria

Student should make every attempt to arrive on time. Guest speakers will begin presenting at 9:00 am. Absences will be marked as non-participation. Each student must present a resume, cover letter and a LinkedIn profile as part of their grade. In addition, students will need to attend at least two LATS seminars held within the semester. The grading system will be as follows:

Class attendance and participation	50
Resume	10
Cover Letter	10
Application to minimum of one Internship position	15
Attendance at two LATS seminars	15
Total	100 %

Grading Scale					
A	≥ 92.5	**B-**	79.5 to 82.4	**D+**	66.5 to 69.4
A-	89.5 to 92.4	**C+**	76.5 to 79.4	**D**	62.5 to 66.4
B+	86.5 to 89.4	**C**	72.5 to 76.4	**D-**	59.5 to 62.4
B	82.5 to 86.4	**C-**	69.5 to 72.4	**F**	≤ 59.5

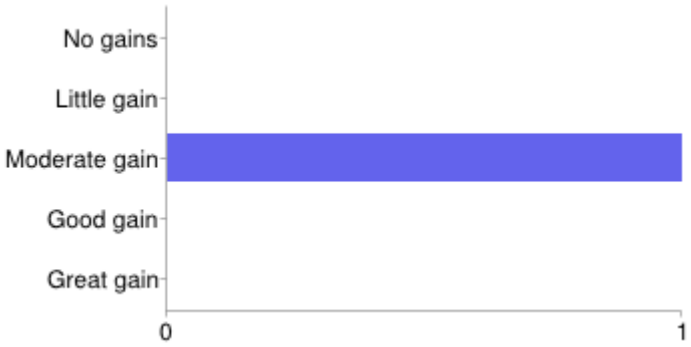
Tentative Schedule

DATE	PRESENTOR	AFFILIATION	TOPIC
Jan. 28	April Blodgett	Harvard Medical School	So you decided to be a scientist!
Feb. 3	Last Day to add/drop a class without a record		
Feb. 4	Jim McLaughlin	ImmunoGen, Inc.	Industrial Biotechnology
Feb. 11	Julio Gagne	ImmunoGen, Inc.	Project Management
Feb. 18	*Presidents Day*		(no classes)
Feb. 25	TBA		
Mar. 4	Wayne Widdison	ImmunoGen, Inc.	Chemistry
Mar. 11	Michelle LoDico	ImmunoGen, Inc.	Manufacturing
Mar. 18 - 24	*Spring Break*		(no classes)
Mar. 25	Brandy Gill	ImmunoGen, Inc.	cGMPs, Quality Assurance
Apr. 1	Linda Buono	ImmunoGen, Inc.	Interview do's and don'ts
Apr. 5	Last day to withdraw from class with a "W"		
Apr. 8	Tim Myott	Cubist Pharmaceuticals	TBA
Apr. 15	*Patriots Day*		(no classes)
Apr. 22	TBA Hand in final resume and cover letter		
Apr. 29	TBA Arranging an on-site visit		

Appendix D. Student Research Experience Complete Survey Results

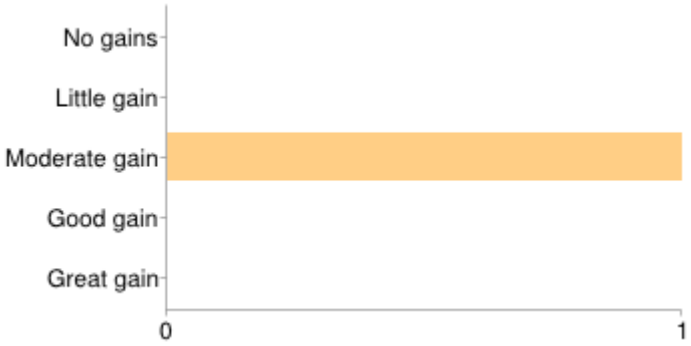
Summary

How much did you GAIN in the ability to think and work like a scientist as a result of your most recent research experience? - Analyzing data for patterns



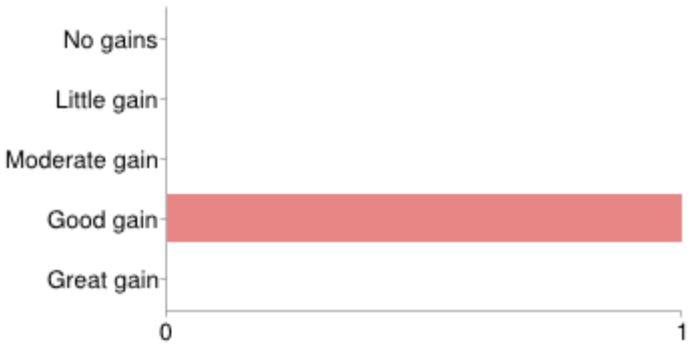
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in the ability to think and work like a scientist as a result of your most recent research experience? - Figuring out the next step in a research project



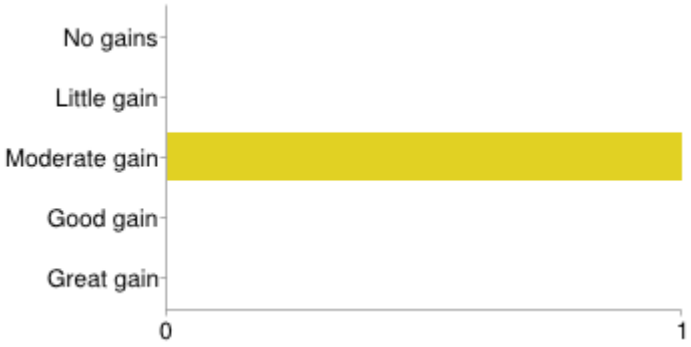
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in the ability to think and work like a scientist as a result of your most recent research experience? - Problem-solving in general



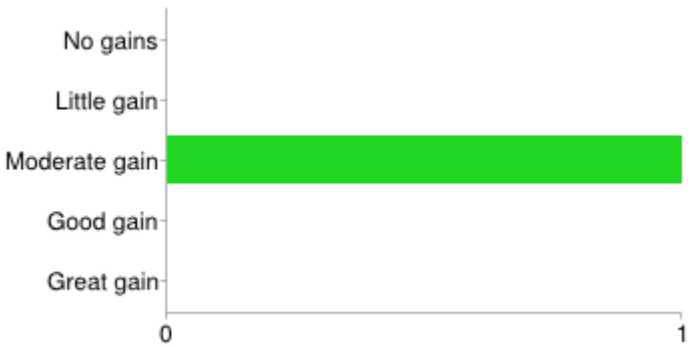
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in the ability to think and work like a scientist as a result of your most recent research experience? - Formulating a research question that could be



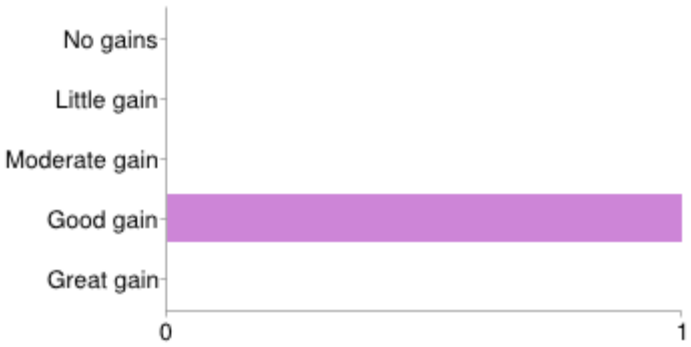
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in the ability to think and work like a scientist as a result of your most recent research experience? - Identifying limitations of research methods and designs



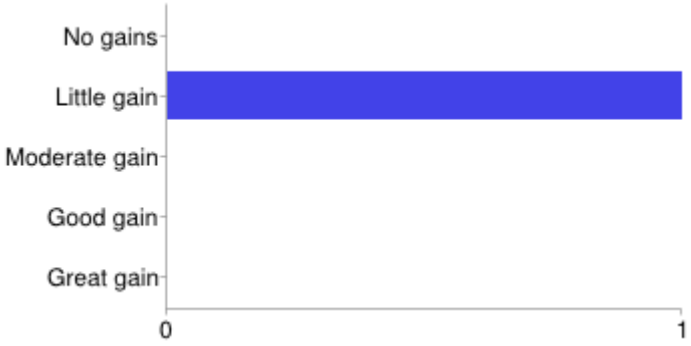
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in the ability to think and work like a scientist as a result of your most recent research experience? - Understanding the theory and concepts guiding my research project



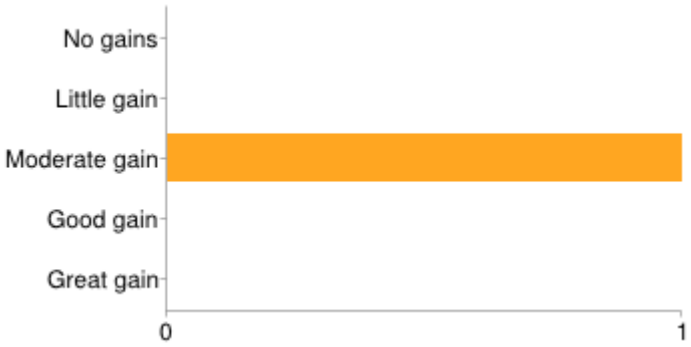
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in the ability to think and work like a scientist as a result of your most recent research experience? - Understanding the connections among scientific disciplines



No gains	**0**	0%
Little gain	**1**	100%
Moderate gain	**0**	0%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in the ability to think and work like a scientist as a result of your most recent research experience? - Understanding the relevance of research to my coursework

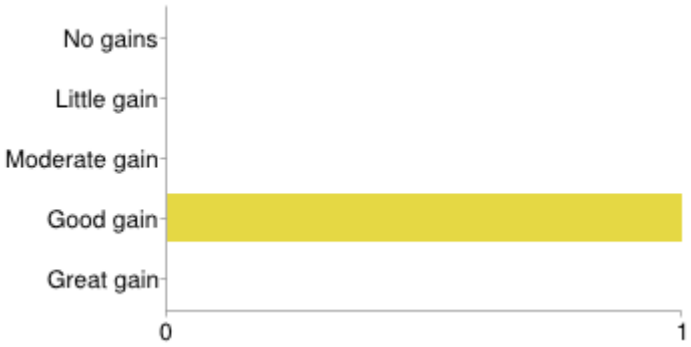


No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in personal skills as a result of your most recent research experience? - Confidence in my ability to contribute to science

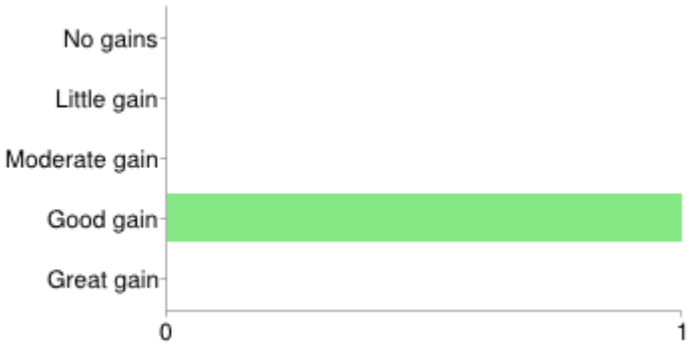
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in personal skills as a result of your most recent research experience? - Comfort in discussing scientific concepts with others



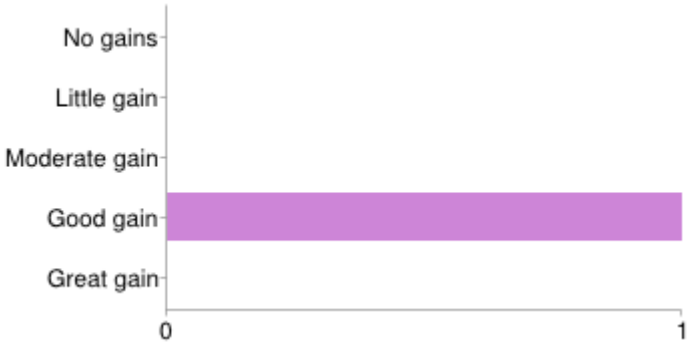
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in personal skills as a result of your most recent research experience? - Comfort in working collaboratively with others.



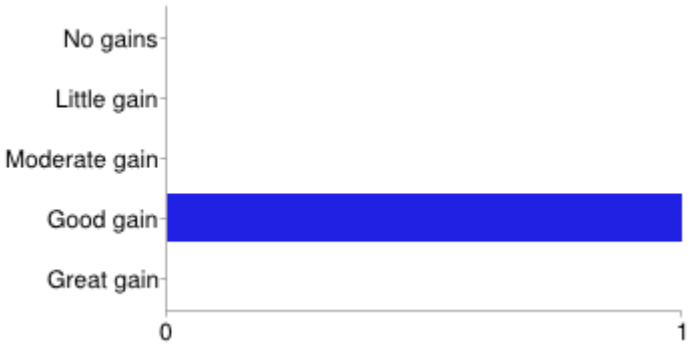
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in personal skills as a result of your most recent research experience? - Confidence in my ability to do well in future science courses



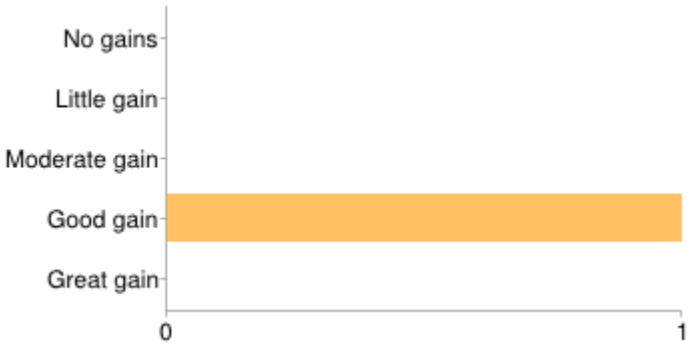
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in personal skills as a result of your most recent research experience? - Ability to work independently



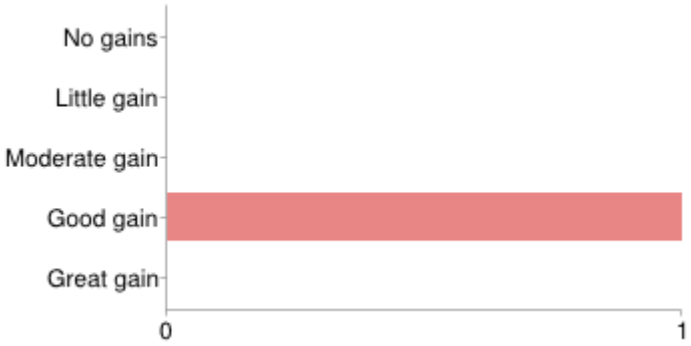
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in personal skills as a result of your most recent research experience? - Developing patience with the slow pace of research



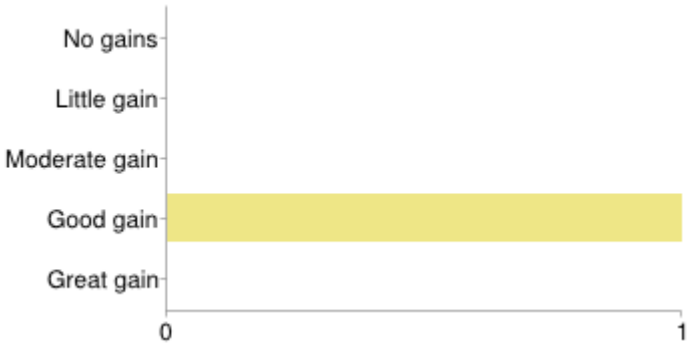
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in personal skills as a result of your most recent research experience? - Understanding what everyday research work is like



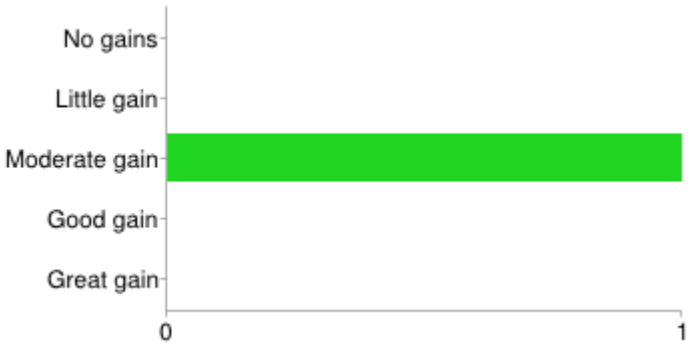
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in personal skills as a result of your most recent research experience? - Taking greater care in conducting procedures in the lab or field



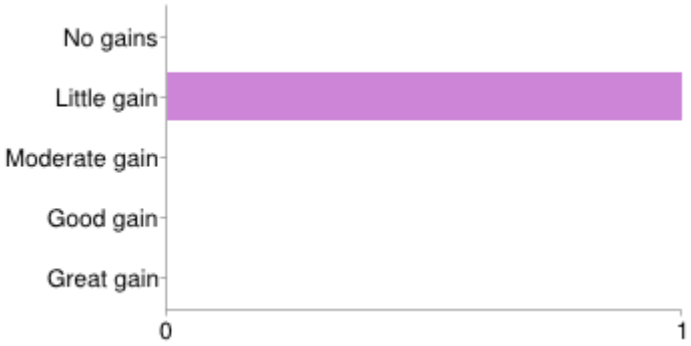
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in scientific skills as a result of your most recent research experience? - Making oral presentations



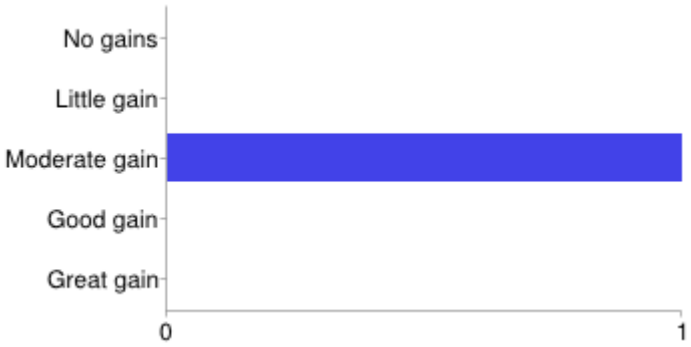
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in scientific skills as a result of your most recent research experience? - Defending an argument when asked questions



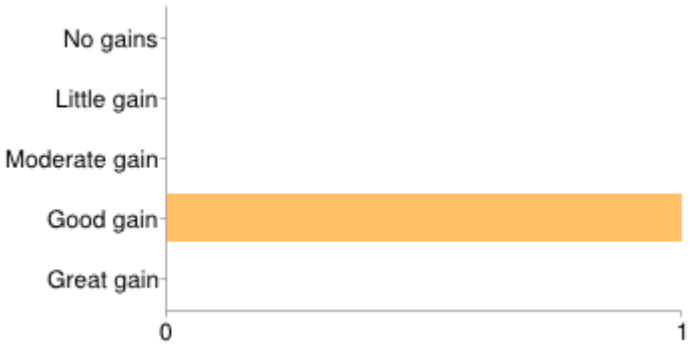
No gains	**0**	0%
Little gain	**1**	100%
Moderate gain	**0**	0%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in scientific skills as a result of your most recent research experience? - Explaining my project to people outside my field



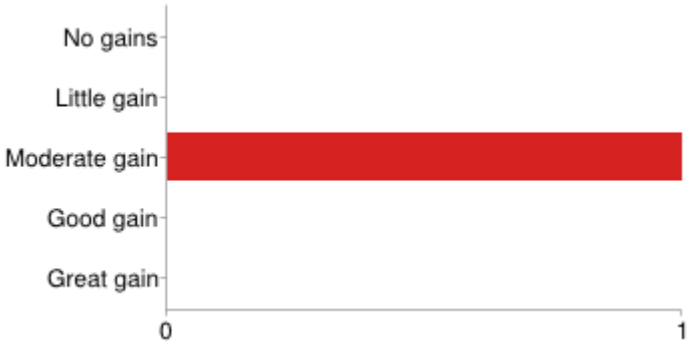
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in scientific skills as a result of your most recent research experience? - Keeping a detailed lab notebook



No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**0**	0%
Good gain	**1**	100%
Great gain	**0**	0%

How much did you GAIN in scientific skills as a result of your most recent research experience? - Conducting observations in the lab or field

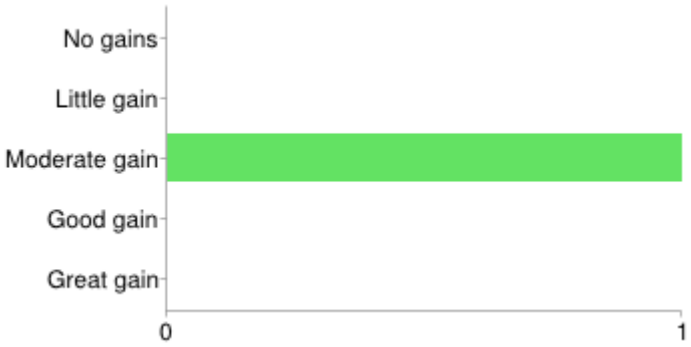


No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in scientific skills as a result of your most recent research experience? - Using statistics to analyze data

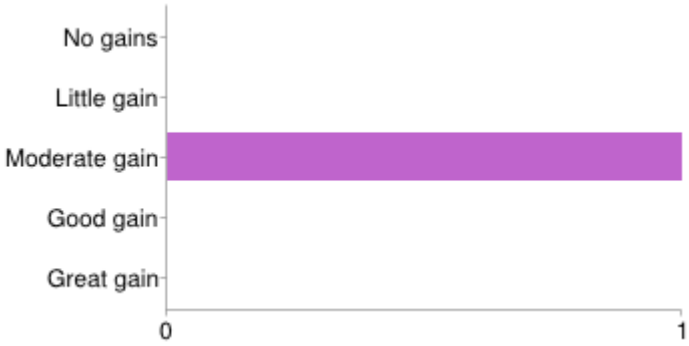
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in scientific skills as a result of your most recent research experience? - Working with computers



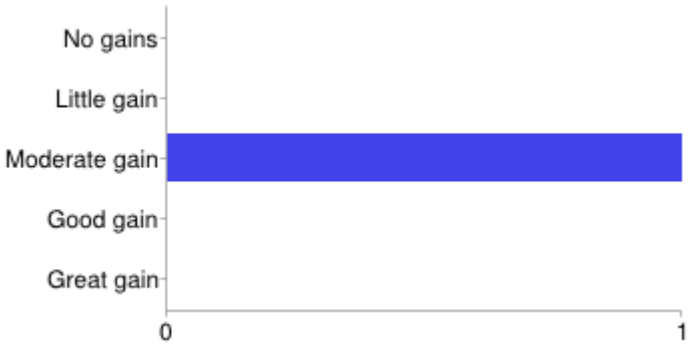
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in scientific skills as a result of your most recent research experience? - Conducting database or internet searches



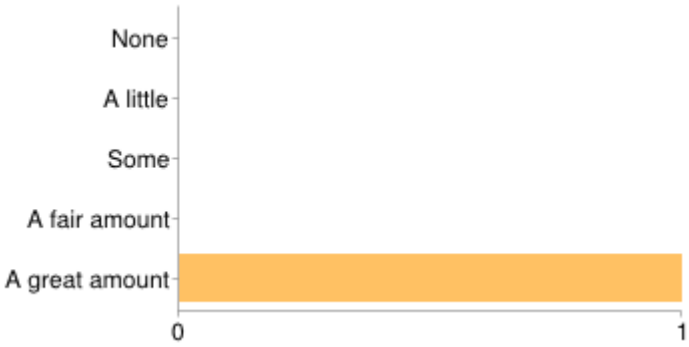
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

How much did you GAIN in scientific skills as a result of your most recent research experience? - Managing my time



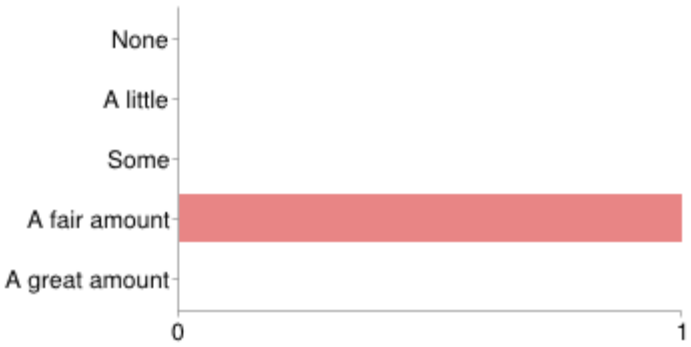
No gains	**0**	0%
Little gain	**0**	0%
Moderate gain	**1**	100%
Good gain	**0**	0%
Great gain	**0**	0%

During your research experience HOW MUCH did you: - Engage in real-world science research



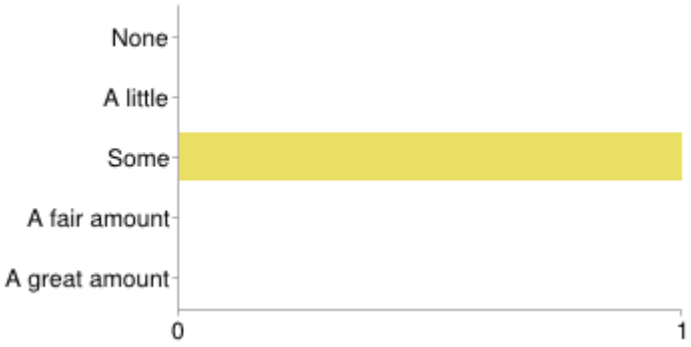
None	**0**	0%
A little	**0**	0%
Some	**0**	0%
A fair amount	**0**	0%
A great amount	**1**	100%

During your research experience HOW MUCH did you: - Feel like a scientist



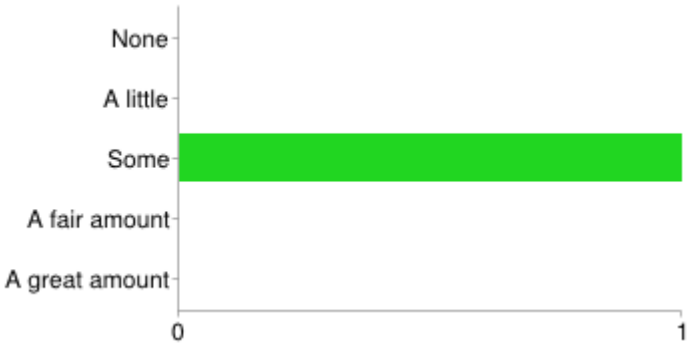
None	**0**	0%
A little	**0**	0%
Some	**0**	0%
A fair amount	**1**	100%
A great amount	**0**	0%

During your research experience HOW MUCH did you: - Think creatively about the project



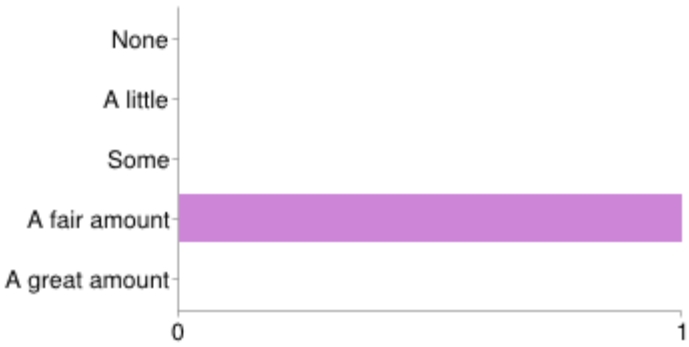
None	**0**	0%
A little	**0**	0%
Some	**1**	100%
A fair amount	**0**	0%
A great amount	**0**	0%

During your research experience HOW MUCH did you: - Try out new ideas or procedures on your own



None	**0**	0%
A little	**0**	0%
Some	**1**	100%
A fair amount	**0**	0%
A great amount	**0**	0%

During your research experience HOW MUCH did you: - Feel responsible for the project



None	**0**	0%
A little	**0**	0%
Some	**0**	0%
A fair amount	**1**	100%
A great amount	**0**	0%

During your research experience HOW MUCH did you: - Interact with scientists from outside your school

No responses yet for this question.

During your research experience HOW MUCH did you: - Feel a part of a scientific community

No responses yet for this question.

Please rate the following: - My working relationship with my research mentor

Not applicable	**0**	0%
Poor	**0**	0%
Fair	**0**	0%
Good	**0**	0%
Excellent	**1**	100%

Please rate the following: - My working relationship with research group members

Not applicable	**0**	0%
Poor	**0**	0%
Fair	**0**	0%
Good	**1**	100%
Excellent	**0**	0%

Please rate the following: - The amount of time I spent doing meaningful research

Not applicable	**0**	0%
Poor	**0**	0%
Fair	**0**	0%
Good	**0**	0%
Excellent	**1**	100%

Please rate the following: - The amount of time I spent with my research mentor

Not applicable	**0**	0%
Poor	**0**	0%
Fair	**0**	0%
Good	**0**	0%
Excellent	**1**	100%

Please rate the following: - The advice my research mentor provided about careers or graduate school

Not applicable	**0**	0%
Poor	**0**	0%
Fair	**0**	0%
Good	**0**	0%
Excellent	**1**	100%

Please rate the following: - The research experience overall

Not applicable	**0**	0%
Poor	**0**	0%
Fair	**0**	0%
Good	**0**	0%
Excellent	**1**	100%

Please feel free to comment on any of the aspects of your experience addressed in the question above

It was a great opportunity for my future carrer and opened my mind.

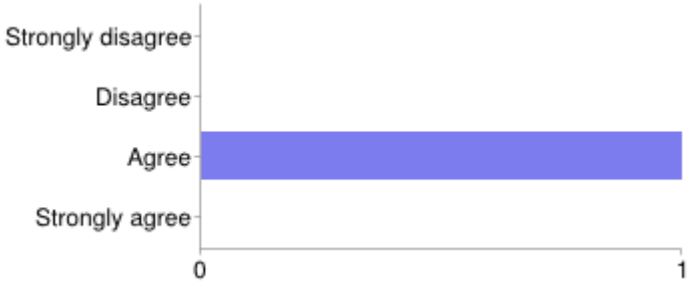
Rate how much you agree with the following: - Doing research confirmed my interest in my field of study

No responses yet for this question.

Rate how much you agree with the following: - Doing research clarified for me which field of study I want to pursue

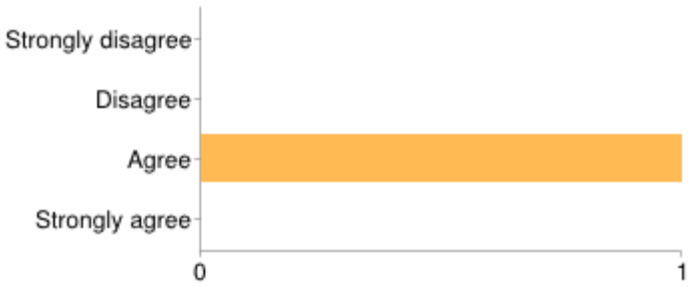
No responses yet for this question.

Rate how much you agree with the following: - My research experience has prepared me for advanced coursework or thesis work



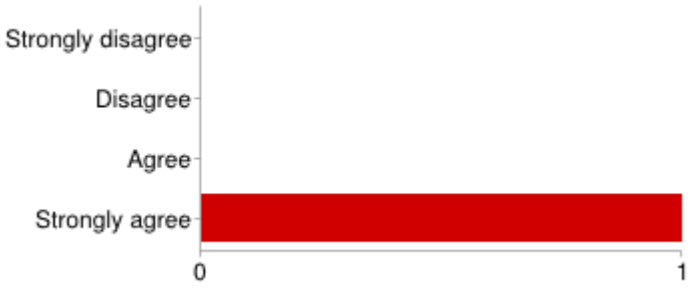
Strongly disagree	**0**	0%
Disagree	**0**	0%
Agree	**1**	100%
Strongly agree	**0**	0%

Rate how much you agree with the following: - My research experience has prepared me for transfer to a 4-year school



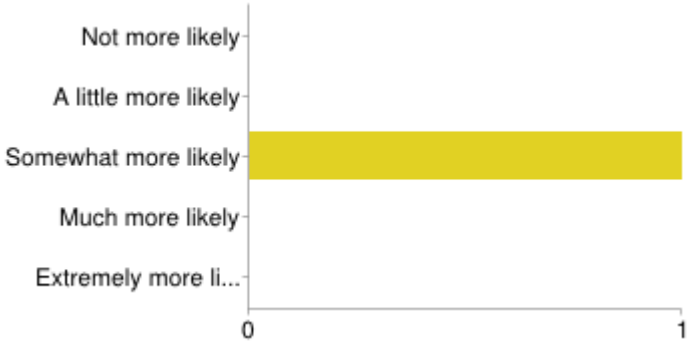
Strongly disagree	**0**	0%
Disagree	**0**	0%
Agree	**1**	100%
Strongly agree	**0**	0%

Rate how much you agree with the following: - My research experience has prepared me for a job



Strongly disagree	**0**	0%
Disagree	**0**	0%
Agree	**0**	0%
Strongly agree	**1**	100%

Compared to your intentions BEFORE doing research, HOW LIKELY ARE YOU NOW to: - Enroll in a bachelors program in science, mathematics or engineering

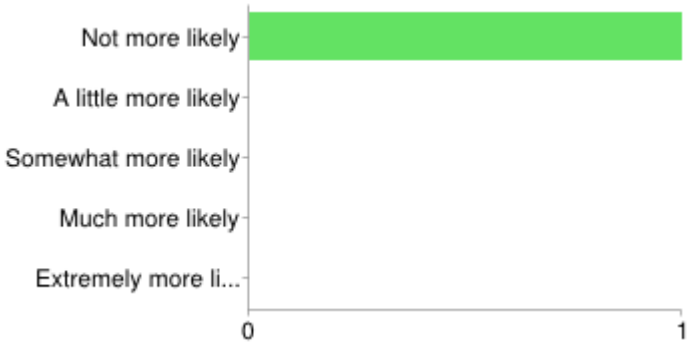


Not more likely	**0**	0%
A little more likely	**0**	0%
Somewhat more likely	**1**	100%
Much more likely	**0**	0%
Extremely more likely	**0**	0%

Compared to your intentions BEFORE doing research, HOW LIKELY ARE YOU NOW to: - Enroll in medical or dental school

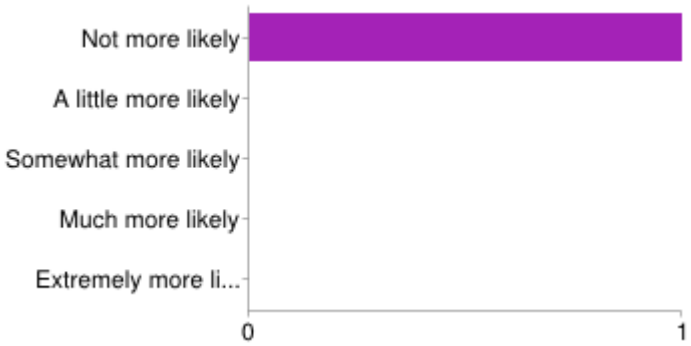
No responses yet for this question.

Compared to your intentions BEFORE doing research, HOW LIKELY ARE YOU NOW to: - Enroll in a program to earn a different professional degree (i.e. law, veterinary medicine, etc.)



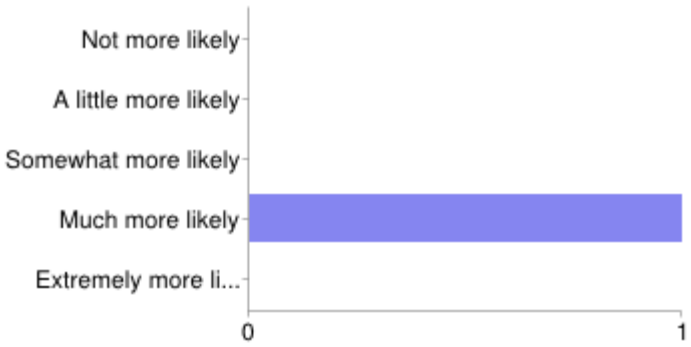
Not more likely	**1**	100%
A little more likely	**0**	0%
Somewhat more likely	**0**	0%
Much more likely	**0**	0%
Extremely more likely	**0**	0%

Compared to your intentions BEFORE doing research, HOW LIKELY ARE YOU NOW to: - Pursue certification as a teacher



Not more likely	**1**	100%
A little more likely	**0**	0%
Somewhat more likely	**0**	0%
Much more likely	**0**	0%
Extremely more likely	**0**	0%

Compared to your intentions BEFORE doing research, HOW LIKELY ARE YOU NOW to: - Work in a science lab



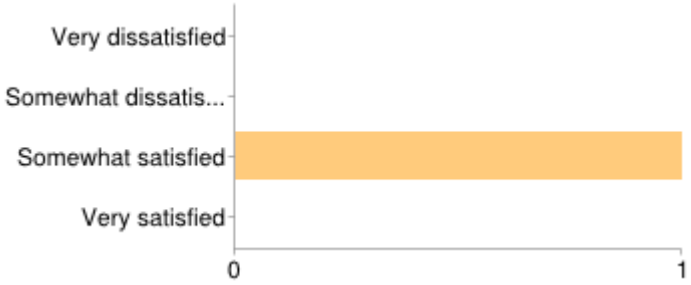
Not more likely	**0**	0%
A little more likely	**0**	0%
Somewhat more likely	**0**	0%
Much more likely	**1**	100%
Extremely more likely	**0**	0%

How did your research experience influence your thinking about future career and graduate school plans?

My research experience influenced more likely to think about science field before I did it.

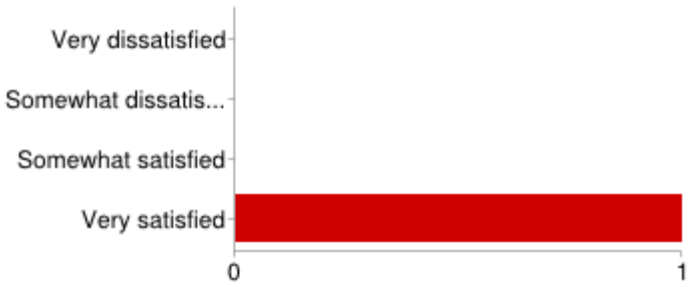
Did you make other gains from doing research that we didn't mention? If so, please briefly describe these.

How satisfied were you with the following aspectsof the research program? - The application process



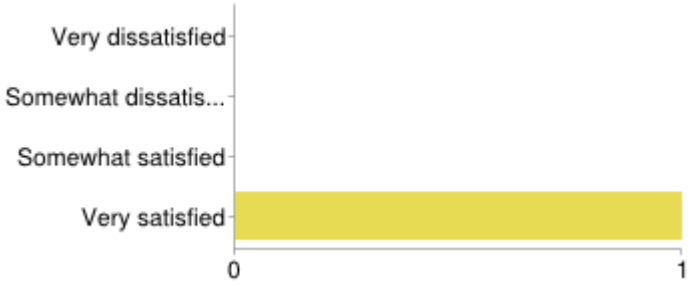
Very dissatisfied	**0**	0%
Somewhat dissatisfied	**0**	0%
Somewhat satisfied	**1**	100%
Very satisfied	**0**	0%

How satisfied were you with the following aspectsof the research program? - Lab or field equipment



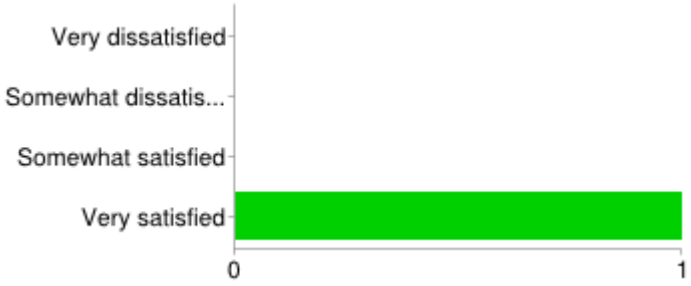
Very dissatisfied	**0**	0%
Somewhat dissatisfied	**0**	0%
Somewhat satisfied	**0**	0%
Very satisfied	**1**	100%

How satisfied were you with the following aspectsof the research program? - Support and guidance from faculty



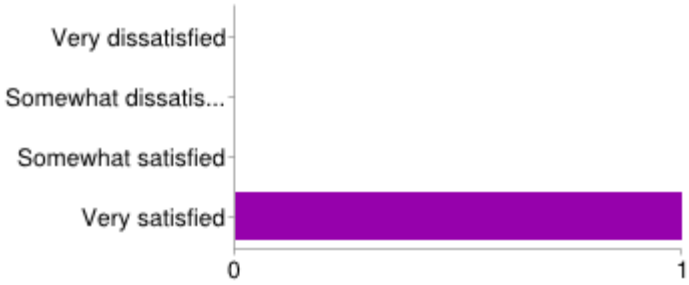
Very dissatisfied	**0**	0%
Somewhat dissatisfied	**0**	0%
Somewhat satisfied	**0**	0%
Very satisfied	**1**	100%

How satisfied were you with the following aspectsof the research program? - Support and guidance from my research mentor



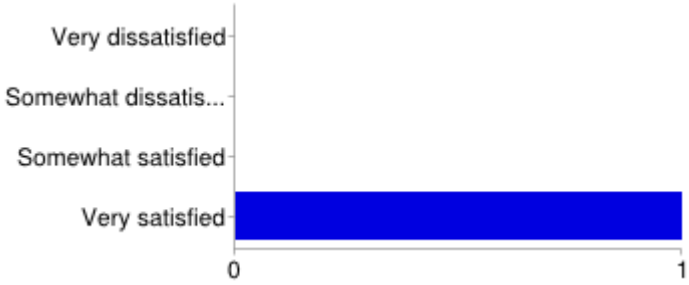
Very dissatisfied	**0**	0%
Somewhat dissatisfied	**0**	0%
Somewhat satisfied	**0**	0%
Very satisfied	**1**	100%

How satisfied were you with the following aspectsof the research program? - Support and guidance from other research group members



Very dissatisfied	**0**	0%
Somewhat dissatisfied	**0**	0%
Somewhat satisfied	**0**	0%
Very satisfied	**1**	100%

How satisfied were you with the following aspectsof the research program? - Financial support



Very dissatisfied	**0**	0%
Somewhat dissatisfied	**0**	0%
Somewhat satisfied	**0**	0%
Very satisfied	**1**	100%

How did you find out about research opportunities on campus? - I knew this institution offered research opportunities to undergraduates before coming here

Yes	**0**	0%
No	**1**	100%

How did you find out about research opportunities on campus? - In class

Yes	**1**	100%
No	**0**	0%

How did you find out about research opportunities on campus? - An academic advisor

Yes	**1**	100%
No	**0**	0%

How did you find out about research opportunities on campus? - An announcement (flyer, poster, email, website, etc.)

Yes	**1**	100%
No	**0**	0%

How did you find out about research opportunities on campus? - A presentation given by professors or students about their research

Yes	**1**	100%
No	**0**	0%

How did you find out about research opportunities on campus? - Other

Yes	**0**	0%
No	**1**	100%

I was motivated to do undergraduate research because I wanted to: - Explore my interest in science

Yes	**1**	100%
No	**0**	0%

I was motivated to do undergraduate research because I wanted to: - Gain hands-on experience in research

Yes	**1**	100%
No	**0**	0%

I was motivated to do undergraduate research because I wanted to: - Clarify which field I wanted to study

Yes	**1**	100%
No	**0**	0%

I was motivated to do undergraduate research because I wanted to: - Clarify whether graduate school would be a good choice for me

Yes	**1**	100%
No	**0**	0%

I was motivated to do undergraduate research because I wanted to: - Clarify whether I wanted to pursue a science research career

Yes	**1**	100%
No	**0**	0%

I was motivated to do undergraduate research because I wanted to: - Have a good intellectual challenge

Yes	**1**	100%
No	**0**	0%

I was motivated to do undergraduate research because I wanted to: - Work more closely with a particular faculty member

Yes	**1**	100%
No	**0**	0%

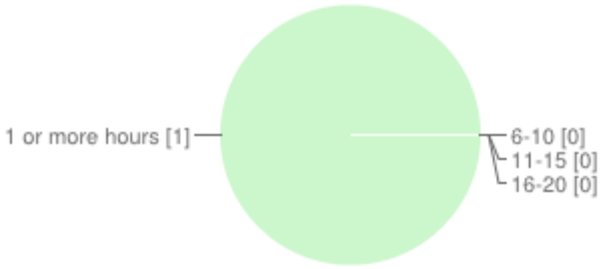
I was motivated to do undergraduate research because I wanted to: - Get good letters of recommendation

Yes	**1**	100%
No	**0**	0%

I was motivated to do undergraduate research because I wanted to: - Enhance my resume

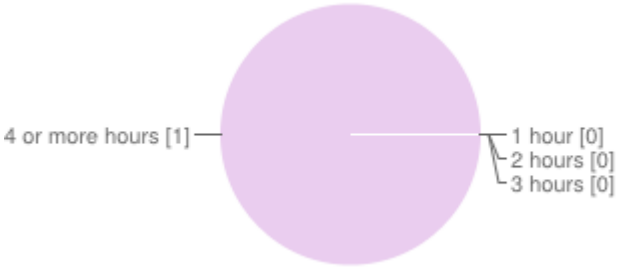
Yes	**1**	100%
No	**0**	0%

How many hours per week did you work at research-related activities in your research experience?



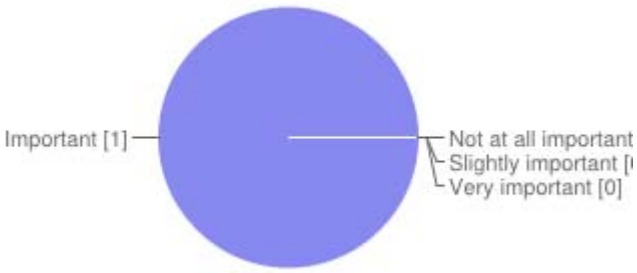
6-10	**0**	0%
11-15	**0**	0%
16-20	**0**	0%
21 or more hours	**1**	100%

How many hours per week did you spend talking with your research mentor?



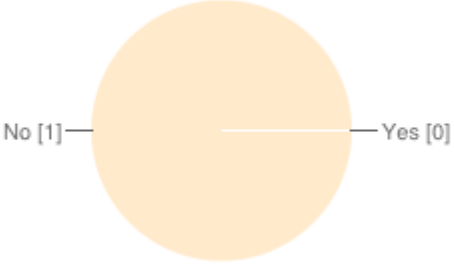
1 hour	**0**	0%
2 hours	**0**	0%
3 hours	**0**	0%
4 or more hours	**1**	100%

How important was the stipend or money you were paid in allowing you to do research?



Not at all important	**0**	0%
Slightly important	**0**	0%
Important	**1**	100%
Very important	**0**	0%

Were you a "visiting rsearcher" -- doing research away from your home institution?



Yes	**0**	0%
No	**1**	100%

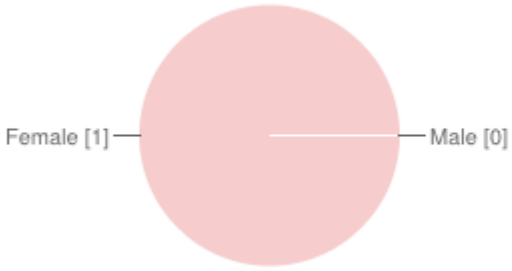
What would have made your research experience better?

Before starting the project, I make sure understand what I need to do and what I am doing.

What would improve the undergraduate research program overall?

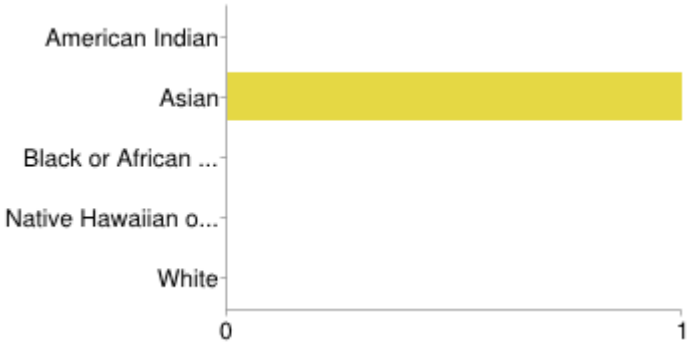
reading the related paper, talking about the project, discussing the idea, spent more time to understand, managing the time, learning others' work

What is your gender?



Male	**0**	0%
Female	**1**	100%

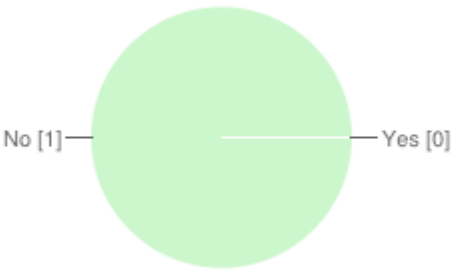
What is your race? (choose all that apply)



American Indian
Asian
Black or African American
Native Hawaiian or other Pacific Islander
White

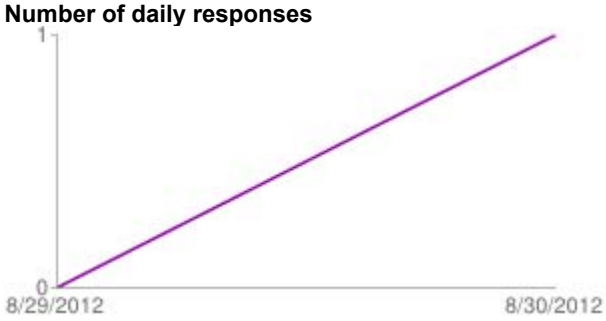
People may select more than one checkbox
percentages may add up to more than 100%

What is your ethnicity?



Yes	**0**	0%
No	**1**	100%

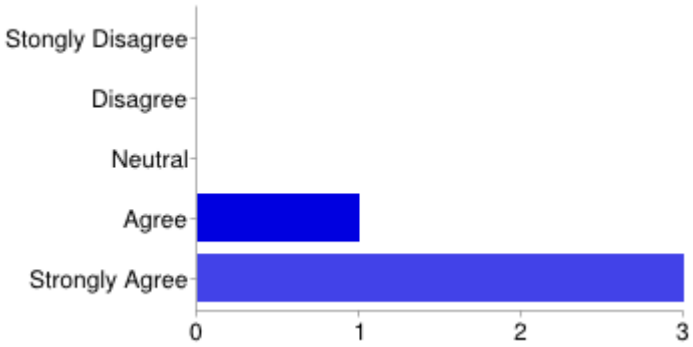
Number of daily responses



Appendix E. Research Mentor Experience Complete Survey Results

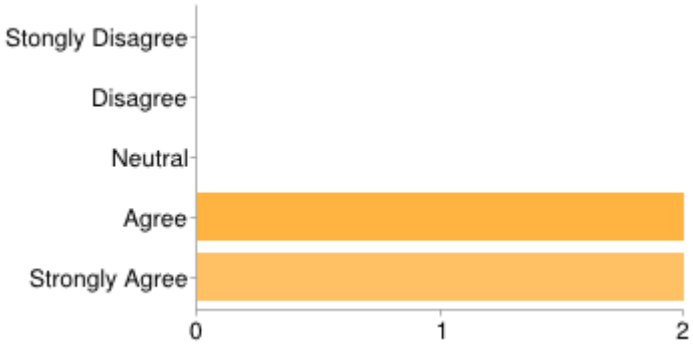
Summary

To what extent do you agree with the following statements? - The intern was competent.



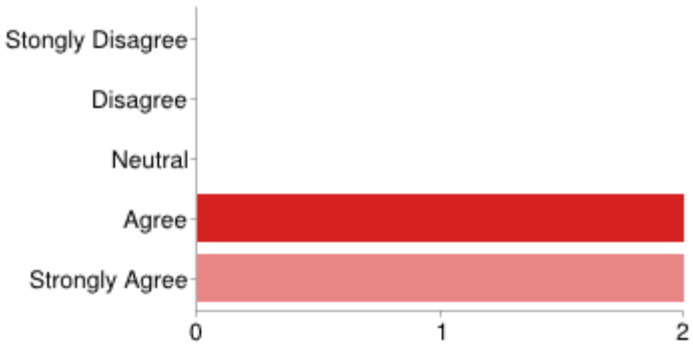
Stongly Disagree	**0**	0%
Disagree	**0**	0%
Neutral	**0**	0%
Agree	**1**	20%
Strongly Agree	**3**	60%

To what extent do you agree with the following statements? - The intern was reliable and responsible.



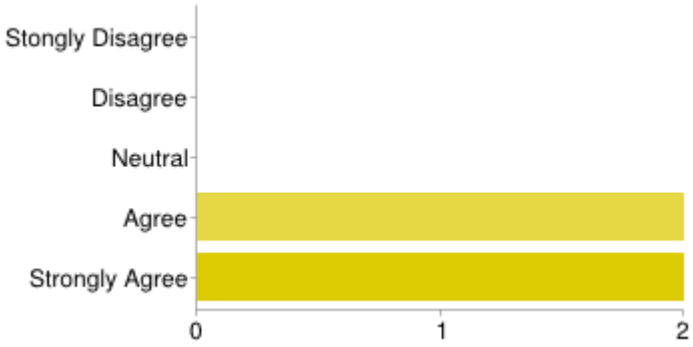
Stongly Disagree	**0**	0%
Disagree	**0**	0%
Neutral	**0**	0%
Agree	**2**	40%
Strongly Agree	**2**	40%

To what extent do you agree with the following statements? - The quality of the intern's work met or exceeded expectations.



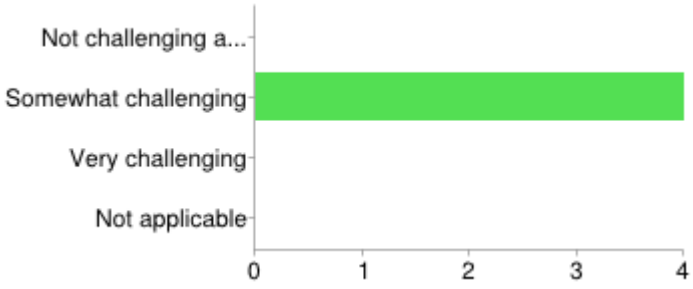
Stongly Disagree	**0**	0%
Disagree	**0**	0%
Neutral	**0**	0%
Agree	**2**	40%
Strongly Agree	**2**	40%

To what extent do you agree with the following statements? - The intern completed most, if not all, tasks in a timely manner.



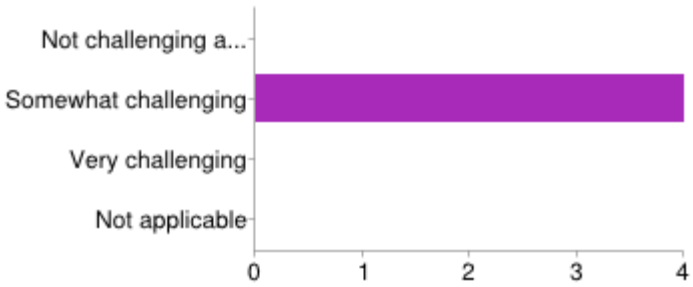
Stongly Disagree	**0**	0%
Disagree	**0**	0%
Neutral	**0**	0%
Agree	**2**	40%
Strongly Agree	**2**	40%

How challenging were the following aspects of the internship for your intern? - Independent work



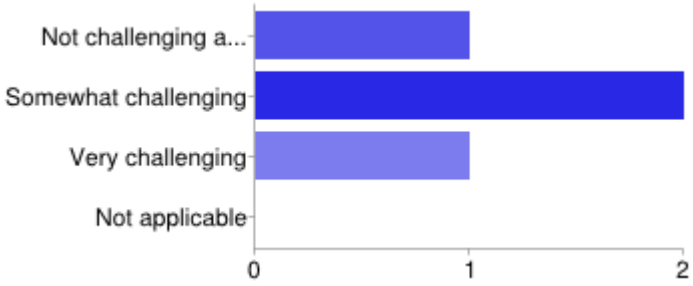
Not challenging at all	**0**	0%
Somewhat challenging	**4**	80%
Very challenging	**0**	0%
Not applicable	**0**	0%

How challenging were the following aspects of the internship for your intern? - Completion of routine tasks/assignments



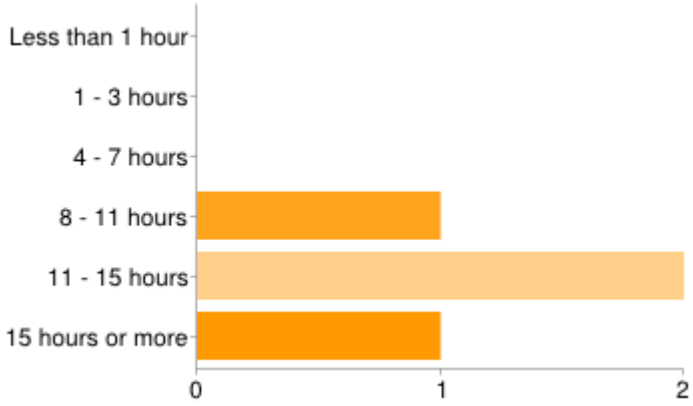
Not challenging at all	**0**	0%
Somewhat challenging	**4**	80%
Very challenging	**0**	0%
Not applicable	**0**	0%

How challenging were the following aspects of the internship for your intern? - Helping me develop new experimental setups / work projects



Not challenging at all	**1**	20%
Somewhat challenging	**2**	40%
Very challenging	**1**	20%
Not applicable	**0**	0%

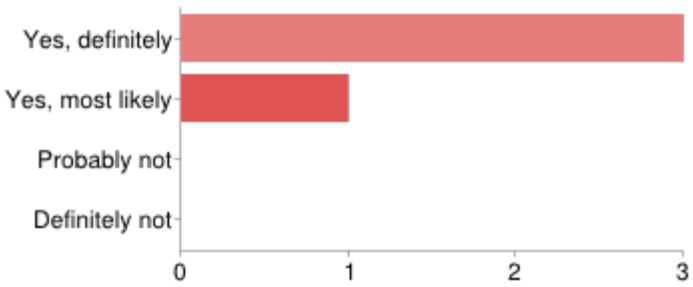
Approximately how many hours per week did you spend directly supervising the intern?



Less than 1 hour	**0**	0%
1 - 3 hours	**0**	0%
4 - 7 hours	**0**	0%
8 - 11 hours	**1**	25%
11 - 15 hours	**2**	50%
15 hours or more	**1**	25%

People may select more than one checkbox, so percentages may add up to more than 100%.

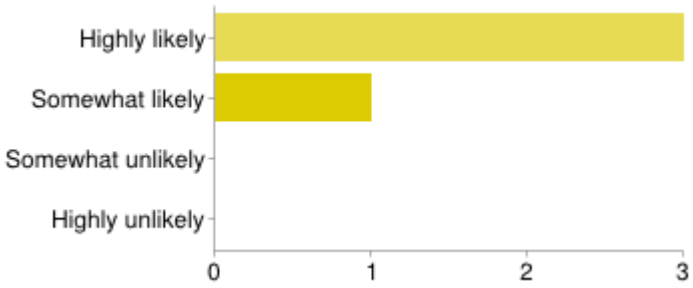
Do you plan to stay in contact with your intern?



Yes, definitely	**3**	75%
Yes, most likely	**1**	25%
Probably not	**0**	0%
Definitely not	**0**	0%

People may select more than one checkbox, so percentages may add up to more than 100%.

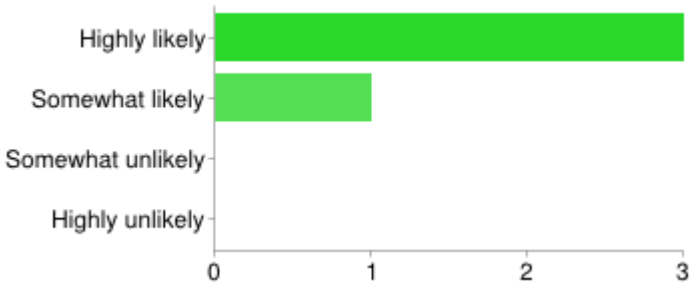
Based on your experience, how likely would you be to recommend the intern for an entry-level laboratory position?



Highly likely	**3**	75%
Somewhat likely	**1**	25%
Somewhat unlikely	**0**	0%
Highly unlikely	**0**	0%

People may select more than one checkbox, so percentages may add up to more than 100%.

Based on your experience, how likely would you be to mentor another intern from Massasoit or recommend a colleague as a mentor?



Highly likely	**3**	75%
Somewhat likely	**1**	25%
Somewhat unlikely	**0**	0%
Highly unlikely	**0**	0%

People may select more than one checkbox, so percentages may add up to more than 100%.

What skills or competencies would you recommend to better prepare future interns for the research experience?

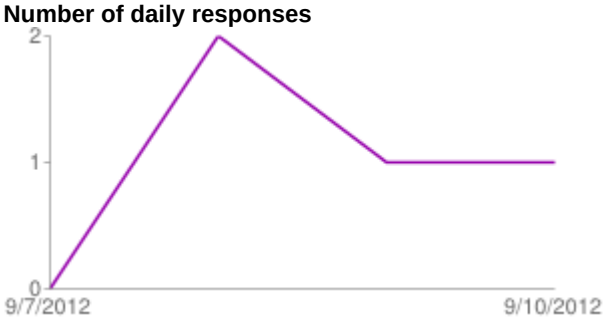
My goal is to improve on the student's ability to reason, problem solve and lab based math skills. In addition, students are exposed to standard lab equipment. The goal is to prepare the students to be comfortable in an entry-level lab position. It was perfect like this.

Please share general comments on and any recommendations for the internship experience.

This summer was the first time a summer research internship was offered at Massasoit. Four students participated. Two of the four were placed in an active lab at Massachusetts General Hospital. These students seemed to have an edge because they were placed in the work force. However, the other two students received similar training at Massasoit. Each student presented their work in a bi-weekly meeting at Mass. Gen. Hosp.

Just great ! See you next year ! The intern was polite and worked well with the other lab members. This was his first lab experience so most of the task he undertook were new ...

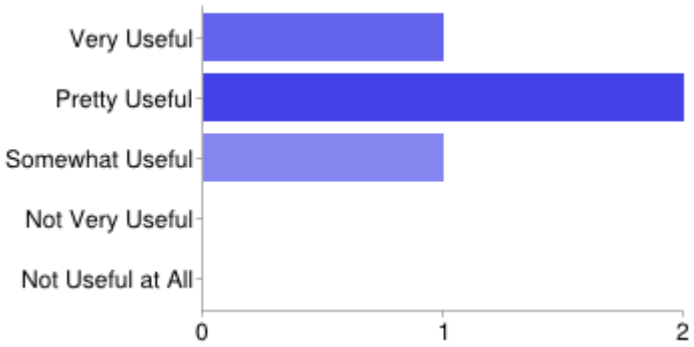
Number of responses without dates: 1
Number of daily responses



Appendix F. CCURI Workshop Complete Survey Results

Summary

Please rate the usefulness of the workshop in helping to implement a research program at Massasoit.



Very Useful	**1**	25%
Pretty Useful	**2**	50%
Somewhat Useful	**1**	25%
Not Very Useful	**0**	0%
Not Useful at All	**0**	0%

People may select more than one checkbox, so percentages may add up to more than 100%.

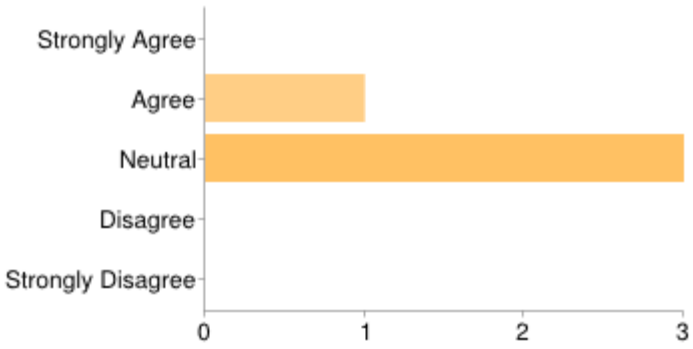
Do you have any comments about the workshop?

The conversation centered about ways Finger Lakes Community College started implementing Research Based learning in one course and how this spread to other courses. We all agreed that we should find one or two projects that students from different courses can participate in. We outlined a rough plan and I will follow up in a Division Meeting to promote the idea of research in the classroom. The meeting was great to help put our thoughts and current practices in perspective as to where we want to go with this. Overall I thought the workshop and Jim Hewlett's presentation was well organized and ...

Are there specific topics you would suggest adding or like more information about?

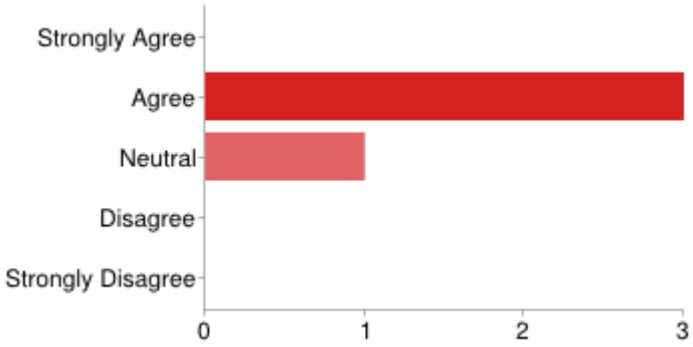
More information on classes doing these changes. Maybe some sample materials to get a better overview. I think we reached our maximum capacity to create a future plan at this one meeting. A follow up meeting would be helpful to keep the momentum going. A specific discussion of what the impact is on faculty satisfaction and/or student mastery of a topic in "standard" vs. inquiry based classes covering similar material.What would be the rationale for faculty to change there current teaching approach and retool their courses?

Please mark the extent to which you agree or disagree with the following statements: - This workshop provided the tools and resources to implement a research program at Massasoit.



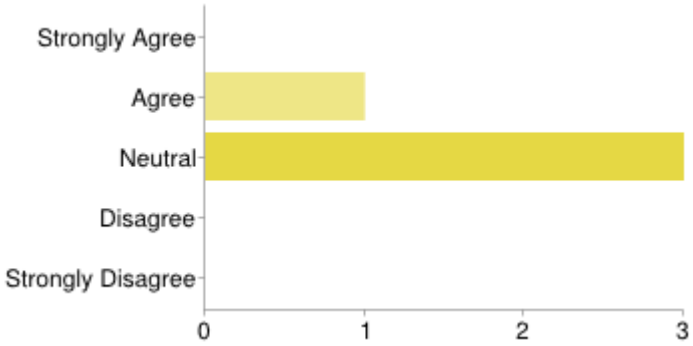
Strongly Agree	**0**	0%
Agree	**1**	25%
Neutral	**3**	75%
Disagree	**0**	0%
Strongly Disagree	**0**	0%

Please mark the extent to which you agree or disagree with the following statements: - My team developed a workable action plan at the workshop.



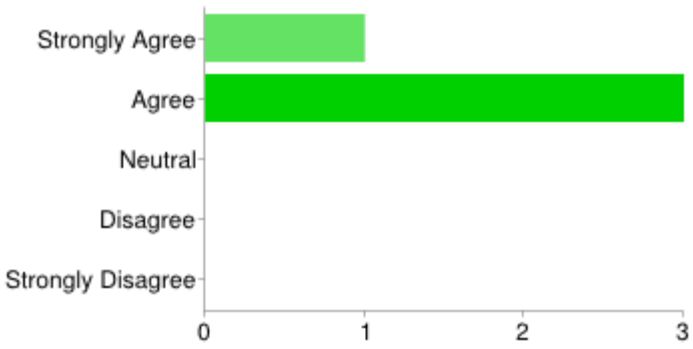
Strongly Agree	**0**	0%
Agree	**3**	75%
Neutral	**1**	25%
Disagree	**0**	0%
Strongly Disagree	**0**	0%

Please mark the extent to which you agree or disagree with the following statements: - I am clear about the steps necessary to implement my team's action plan.



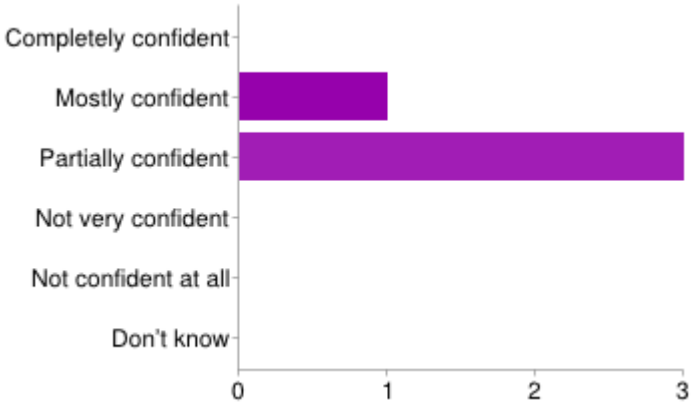
Strongly Agree	**0**	0%
Agree	**1**	25%
Neutral	**3**	75%
Disagree	**0**	0%
Strongly Disagree	**0**	0%

Please mark the extent to which you agree or disagree with the following statements: - The workshop provided enough information to make my team's brainstorming session productive.



Strongly Agree	**1**	25%
Agree	**3**	75%
Neutral	**0**	0%
Disagree	**0**	0%
Strongly Disagree	**0**	0%

How confident are you that Massasoit will successfully implement a research program?

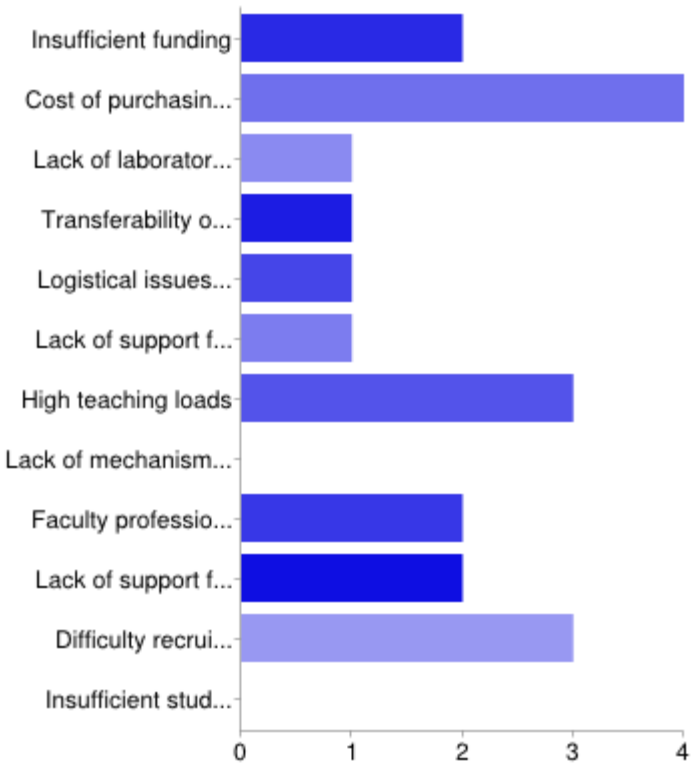


Completely confident	**0**	0%
Mostly confident	**1**	25%
Partially confident	**3**	75%
Not very confident	**0**	0%
Not confident at all	**0**	0%
Don't know	**0**	0%

What are your biggest concerns about implementing a research program at Massasoit?

Facilities - like instruments, space, room availability Getting support One big concern is to get other faculty involved. There are some faculty that are interested, but feel they do not have the time due to their teaching load. I am confident that Massasoit can implement a research program, but one person will have to take the lead and show how it is done.

What barriers do you foresee facing at Massasoit as we implement a research program? (Mark all that app



Insufficient funding
Cost of purchasing/maintaining equipment
Lack of laboratory or research facilities
Transferability of courses to four-year institu
Logistical issues (purchasing, scheduling)
Lack of support from administration
High teaching loads
Lack of mechanism for faculty to receive cre
Faculty professional development needed
Lack of support from faculty
Difficulty recruiting students
Insufficient student preparation

People may select more than one checkbox
100%.

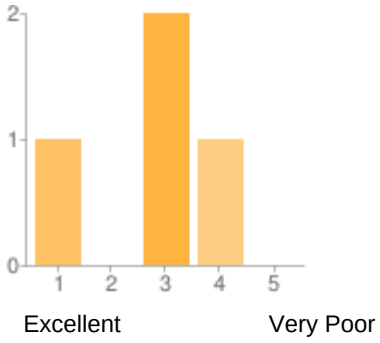
Moving forward, how could CCURI best support us in implementing our research program?

CCURI has offered to help us make connections with other community colleges that have undergraduate research. This is a tremendous help. These connections can help us design exceptable research questions that are reasonable for our students to work on. Not sure.

How could the workshop be improved?

More specific to the people involved. Break it up in different groups. For our first workshop of this type, we did pretty good. I hope to see more in the near future that will include more people. This will help bring in more ideas and discussion. A specific discussion of what the impact is on faculty satisfaction and/or student mastery of a topic in "standard" vs. inquiry based class covering similar material. What's the rationale for faculty to change there current approach and retool?A discussion of what types of research or questions that faculty consider to be of general interest an ...

Overall, how would you rate the workshop?



1 -	Excellent	**1**	25%
2		**0**	0%
3		**2**	50%
4		**1**	25%
5 -	Very Poor	**0**	0%

Do you have any additional comments?

N/A

Number of daily responses