

SECTION XIII: SUMMARY – PROGRAM STRENGTHS

A. List and describe the program’s major strengths, as detailed at the end of each section of this review, or in the program’s external report (accreditation, approval, or certification).

SECTION	AREA OF STRENGTH
I	<p>To receive MLSEC endorsement, the Laboratory Science Program has met the following criteria:</p> <ol style="list-style-type: none"> 1) Students completing the program courses achieve the core competencies agreed upon by MLSEC industry and higher education members. . 2) The program focuses on the knowledge and skills necessary for entry level positions in the research and manufacturing sectors of the biotechnology industry. 3) Credits earned through the program are readily linked to an associate’s level degree. <p>The NECC Lab Science Program was further given gold level endorsement because, in addition to meeting the criteria above, it requires students to complete an internship before graduation</p>
II	<p>The Lab Science program strongly supports the mission of the College and its seven core values of student engagement, collaboration, personal and professional growth, respect, diversity, access and opportunity, and excellence. Furthermore, the Lab Science program contributes significantly to Strategic Goals 1, 2, 3, 4, and 5</p>
III	<p>A comprehensive lab safety policy is essential to welfare and safety of any students or faculty working in a laboratory at the college. While the lab safety regulations are not specific to the Lab Science program alone, they are an integral part of the safety protocols we teach our students.</p>
IV	<p>The curriculum was thoughtfully developed and implemented to train students for entry level employment as a lab technician or for transfer to an appropriate four year program. Faculty have actively sought the input of regional industry and transfer programs and implemented their suggestions into the curriculum. Faculty continue to review and revise the curriculum on a regular basis.</p>
V	<p>The faculty are all excellent teachers in their fields. Because the same four faculty teach the core courses in the program each year, they are able to take individual responsibility for their classes and craft a particularly cohesive and effective curriculum.</p>
VI	<p>The laboratory spaces are recently renovated (or soon to be renovated) and in good condition. The program has access to a wide variety of instrumentation and equipment necessary for training students in current lab techniques. The library staff has been very responsive to our requests for help in connecting our students with appropriate scientific research tools. Financially, we are able to maintain and service our major instruments and provide supplies for our laboratories from the college budget. Renovation costs for new science lab space will be covered by the Capital Grant from the Massachusetts Life Science Center.</p>

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VII	The Lab Science student body reflects the diversity of the college's general population. Lab Science faculty are actively incorporating strategies to help support at-risk students and improve retention.
VIII	The Lab Science program has a diverse and helpful advisory board. The externship supervisors that have worked with us to date have also been committed to providing well-structured and appropriate externship experiences for our students as well as giving useful and thoughtful feedback.
IX	The current Lab Science Program outcomes are comprehensive and cover all the criteria required for endorsement by the Massachusetts Life Science Education Consortium. In the future, focusing on select outcome assessment through the externship supervisor survey should be manageable in terms of data collection and analysis.
X	The Lab Science program has developed a variety of strong links to local secondary schools, four year colleges, and businesses. The outreach workshops are in great demand with our partner high school and secondary schools. Approximately half of our students take advantage of the transfer agreements with four year colleges, particularly with the University of Massachusetts Lowell. Finally, the externship host sites represent a wide variety of laboratory areas and have all provided a positive and valuable training experience for our students
XI	Our graduates are well prepared and receive considerable praise from externship supervisors on the strength of their lab skills and potential as lab technicians. When transfer and part-time employment are included, 88.5% of our graduates (23 out of 26) have successfully continued on in STEM fields.
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SECTION XIV: SUMMARY – PROGRAM CHALLENGES AND AREAS FOR IMPROVEMENT – ACTION PLANS

A. List and describe the program’s major challenges and areas for improvement detailed at the end of each section of this review, or. For each challenge, describe the action recommendation, as well as the individuals responsible for implementation.

SECTION	CHALLENGE - AREA FOR IMPROVEMENT	ACTION RECOMMENDATION – INDIVIDUAL(S) RESPONSIBLE
I	<p>In preparation for our second endorsement application with the MLSEC, the Laboratory Science Program has requested approval to make BIO230, Cell Biology, a program requirement. Previously, this course was a program elective option. By making it a required course, it ensures that all graduates of the Lab Science program will receive training in all the MLSEC core competencies.</p>	<p>This request has been submitted to the Academic Affairs Committee for approval. The request was made by Kevin Mitchell, program faculty.</p>
II	<p>The Lab Science program does need to move forward in evaluating a proposed articulation agreement between our program and the biotechnology program at Greater Lawrence Technical High School. In addition, the faculty need to keep an eye on enrollment levels and continue efforts to recruit more students into the program. To improve advising of our current students, faculty also need to input academic plans into DegreeWorks and provide opportunities to connect with students in developmental courses who have not yet entered the core program courses. Finally, faculty need to take advantage of the resources offered by the developing programs at Career Services to help prepare and support our students in their job searches after graduation.</p>	<p>The Lab Science faculty need to take the time necessary to review the biotechnology curriculum at Greater Lawrence Technical High School and decide what, if anything, will stand in for any of our courses. All Lab Science faculty are responsible for this action.</p> <p>The following recruitment efforts have begun since the fall of 2013:</p> <ul style="list-style-type: none"> • Discussions have begun with faculty and administrators at the Haverhill High School STEM Academy on ways to collaborate to promote careers in STEM fields and the Lab Science program as a potential career pathway. Kim Waligora is responsible for this connection. • Discussions have begun with the NECC Center for Adult Education Programs and Practitioners (CAEPP) about a possible collaboration on a grant-funded summer STEM Academy to better recruit and prepare adult

		<p>learners for success in the Lab Science program. Kevin Mitchell is responsible for this action.</p> <ul style="list-style-type: none"> • As part of an NECC Leadership Academy project, plans have begun for an appreciative inquiry based study of the Lab Science program strengths that we can market to prospective new students. Marguerite White-Jeanneau is responsible for this action. <p>Faculty also need to continue to review student academic plans in DegreeWorks and input new plans for incoming students. As part of this effort, students must be encouraged to come in and talk with faculty advisors to ensure their academic plans fit their goals and schedules. All Lab Science faculty are responsible for this action.</p> <p>Finally, faculty need to work more closely with Ashley Bragger, the new Career Connections coordinator, to find resources to better prepare our students for their job searches. All faculty are responsible for this action.</p>
<p>III</p>	<p>Students who are still in developmental courses do not get class time contact with program faculty and often don't come in for advising time with faculty. Academic plans for these students in DegreeWorks can't be effectively tailored to these students goals and schedules without this contact. Furthermore, the academic plans don't really help these students understand what the program is about or what they can do with a degree in Laboratory Sciences. This is a major gap in the faculty-student advising loop.</p>	<p>Faculty must continue implementing academic plans in DegreeWorks for all newly enrolled and continuing Lab Science students. This is the responsibility of all Lab Science faculty.</p> <p>Inviting all declared Lab Science majors (those enrolled in core program courses and those in developmental courses) to a welcome reception at the beginning of the fall semester would be a good way for faculty to meet new Lab Science students and answer any questions they might have about the</p>

		program. This will be the responsibility of the program coordinator, Marguerite White-Jeanneau.
IV	While most program specific learning outcomes are covered in a multiple courses, there are two outcomes that are only covered in 1 course (outcomes 12 and 16). These are specific outcomes required for gold level endorsement by MLSEC and the program would be strengthened if these were reinforced in more courses.	Cell Biology (BIO230) provides further reinforcement for outcomes 12 and 16. Currently BIO230 is a recommended elective for students in the biotechnology concentration. Lab Science faculty have already applied for approval for this action with the Academic Affairs committee. Kevin Mitchell initiated this process.
V	Helping students find and secure externships is a major task taken on by faculty on top of their teaching responsibilities. At current enrollment levels, it is barely manageable. Should enrollment levels increase, it will be too large of a task for faculty to manage on top of their teaching responsibilities.	As other programs at the college (Business and Journalism, for example) start to develop externship programs, the college should consider having a staff person who can help faculty and students in a wide variety of programs find and secure appropriate externship opportunities. This is the responsibility of the college administration.
VI	The current program laboratory space is small and crowded especially for our larger classes of Integrated Science I and II. Space issues in this room have also required that some major instrumentation be located upstairs in the microbiology lab. This means that the Instrumental Analysis and Research Experience classes must split their time between two lab rooms. There is a need for more PCR equipment for use in molecular biology experiments and an autosampler upgrade for one of our current instruments. There is also a need for a working laminar flow hood for cell biology experiments and a reliable autoclave.	The last renovation covered under the MLSC Capital grant will make a large and currently underused geology lab into a general use laboratory to be shared by Integrated Science I and II, Cell Biology, Ecology, and a new forensic science class. Molecular biology equipment will be moved from the current Lab Science room into this lab. The Lab Science lab room will become an instrumentation lab and the GC will be moved from the microbiology lab. Additional funding has been requested through the Perkins Vocational grant to finish outfitting the new general lab space and to provide support for an autosampler upgrade and reinstallation of the GC in the Lab Science lab. Mike Cross (Natural Sciences Department Chair) and Bob West (Department Lab Technician) are leading this action with the assistance of the rest of the

		<p>Lab Science faculty.</p> <p>Additional thermal cyclers have been requested through the Perkins Vocational grant. They will also be included on a grant proposal written in collaboration between Steven Fuchs of Tufts University and Kevin Mitchell. Kevin Mitchell, Mike Cross, and Bob West are all contributing to these efforts.</p> <p>Alternative set-ups for a laminar flow hood need to be investigated. Kim Waligora is leading this action.</p> <p>Finally, either a new autoclave should be purchased for the Haverhill campus or there should be a complete overhaul done to the current one. Bob West (Lab Technician) is leading this action.</p>
<p>VII</p>	<p>The increase in total student enrollment from 2010-2013 probably reflects students who have stayed at the college to finish completing elective and transfer requirements rather than an increase in new student enrollment.</p>	<p>Lab Science faculty need to continue their efforts to market the Lab Science program and increase new student recruitment. Please see Section II recommended actions for more details.</p>
<p>VIII</p>	<p>Not every member of the advisory board is active. We are trying to expand our advisory board membership as a result. We are also constantly on the lookout for more externship sites and supervisors.</p>	<p>We will continue to keep an eye out for new advisory board members. Our externship supervisors are a good source for potential new advisory board members and should be approached on this topic. All Lab Science faculty are responsible for this action.</p> <p>We will continue to market our program to regional companies to develop new externship opportunities. All Lab Science faculty are responsible for this action. In addition, the college should consider the addition of a staff member dedicated to helping identify and develop externship opportunities for a variety of</p>

		programs as suggested in section 5.
IX	Only select Program Learning Outcomes will be assessed formally in the future. Faculty must still be aware of student performance for the other outcomes so they can address potential issues and problems. Faculty must also take the time to enter in the data and perform data analysis on the externship survey results in a timely fashion including the backlog of data from the 2012 and 2013 externships. Initial analyses have begun with this data but more thorough and efficient analyses would be possible if the data were available in spreadsheet format.	<p>The full list of outcomes should be informally reviewed by faculty on a yearly basis. This is the responsibility of all Lab Science faculty.</p> <p>The backlog of data from the 2012 and 2013 externship supervisor surveys must be entered into a spreadsheet and fully analyzed. This is the responsibility of Kim Waligora and Marguerite White-Jeanneau.</p>
X	The Lab Science faculty need to move forward with the curriculum review for the biotechnology program at Greater Lawrence Technical School so we can make a decision on whether to continue with the articulation agreement process. Furthermore, we cannot expect all of the laboratories who have hosted externs in the past to continue to do so in the future. As a result, we must continue to expand our list of potential externship hosts.	<p>The Lab Science faculty needs to find the time to review and discuss the curriculum for the biotechnology program at Greater Lawrence Technical School. This is the responsibility of all Lab Science faculty.</p> <p>The Lab Science program needs to continue to promote itself amongst local scientific businesses to keep developing a pool of potential externship sites for future students. This is the responsibility of all Lab Science faculty.</p>
XI	There is still a need for better support and training for the job search process for those graduates still looking for employment in the STEM field. Faculty need to work more closely in the future with the new Career Connections coordinator at the college and have students take advantage of the workshops offered on interviews and cover letters.	Faculty need to work more closely with Ashley Bragger, the new Career Connections coordinator, to find resources to better prepare our students for their job searches. All faculty are responsible for this action.
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SECTION XV: RESOURCES REQUESTED