

# MLSC - Capital Program Application: Phase II

0. Application ID	f7a9731c-9d86-45e9-9e63-ce63c816f31d
1. Phase I Application ID	1d4c30f2-042f-4ca6-a83a-f3df039adcaf
2. Applicant Organization Legal Name	Middlesex Community College
3. Type of Institution	College/University
4. Project Narrative	A PDF document was uploaded and is included as an appendix to this document.

## 5. Senior Official Signature and Acceptance

I verify that I am authorized to commit my organization and to make this application on behalf of the organization. I certify that all necessary votes have been taken by the authorizing authorities to accept MLSC funding for this project and will provide certified copies of such votes upon request. I certify that all information provided as part of this Phase II Application is correct and that the statements made herein, including all attachments and exhibits, are true and correct to the best of my knowledge. The submission of false information to the MLSC is subject to prosecution under the False Claims Law at M.G.L. c. 12, sections 5A – 5O.

I understand that this Life Sciences 2013 Capital Program Phase II Application may be disqualified if it does not contain all required information or if the Applicant does not meet the eligibility criteria required under the Program, and I further acknowledge and agree that the sample Agreement provided on the MLSC's website includes the MLSC's standard terms and conditions, but is subject to the inclusion of additional terms and conditions at the sole discretion of the MLSC that may be relevant and necessary to minimize the MLSC's risk(s) in making this investment.

I specifically acknowledge that all of the terms and conditions of the Solicitation are mandatory.

I understand and acknowledge that all materials submitted as part of this application are subject to disclosure under the Massachusetts Public Records Law. Furthermore, I understand and acknowledge that I have followed the procedures set forth in Section 8.1.2 of the Life Sciences 2013 Capital Program Solicitation for any documents that I believe may be proprietary in nature and that may fall within the parameters of the MLSC's Trade Secrets Exemption; and that the MLSC's receipt of such documents does not represent a finding by MLSC or the Supervisor of Public Records that such documents fall within the Trade Secrets Exemption.

I acknowledge and agree that the MLSC has sole discretion to determine: (1) which applicants, if any, receive benefits under the Program; (2) that material change(s) to the project described in this Application may be cause for rescission of any award; and (3) that additional terms and conditions may be necessary to the Grant Agreement template provided as part of this Solicitation.

**Carole A. Cowan, Ed.D.**

President

Signed on: 11/21/2013 4:44:48 PM

# Project Summary

The next 7 page(s) are the project summary, corresponding to question 3 submitted by the applicant.

**Middlesex Community College**  
**PHASE II APPLICATION OUTLINE**

**I. Elevator Pitch:** Middlesex Community College (MCC) seeks funding for constructing and equipping a new biotechnology facility that will replace completely the current, outdated facility. Comprehensive planning for the new facility was completed with the assistance of a planning grant from the Massachusetts Life Sciences Center and MCC funding. The multi-phase planning process included confirming the current and emerging workforce skills required by the life sciences industry through a workforce needs and curriculum analysis and identifying the most feasible facility option for enhancing the education and training of MCC biotechnology students through an architectural study. The proposed facility, to be located on the fifth floor of the Talbot Science Building in dedicated space, will include a combined lecture room and laboratory, a Class 10,000 cleanroom, gowning area and prep room. A clean room is not part of MCC's current facilities; the addition of this important educational resource, along with the other proposed areas and related equipment, will significantly expand the capacity of MCC to prepare its students in the best possible way to meet the workforce needs of the life sciences industry.

**II. Summary of Training Program and Industry Collaboration**

**A. Specific need and intended use of, as relevant, lab renovation/expansion, equipment/supplies**

Enrollment in both the biotechnology certificate and associate degree programs continues to grow. Fall enrollments have grown from 111 students in 2008 to 180 students in 2013, a 62% increase. The current biotechnology facility, located in the Talbot Health and Science Building in Lowell, was established in the mid-nineties and has not been significantly upgraded since that time, except for the addition of new or replacement equipment. The very overcrowded space limits the number of courses that can be offered, the number of course sections, and the types of training that can be provided. The proposed dedicated space will make it possible to offer day sections of four courses now only currently offered in the evenings or on weekends (Molecular Biology, Immunology, Biochemistry, and cGMP). In addition, numerous courses will be developed or enhanced that will impact all students enrolled in the certificate or degree programs. The current total enrollment in the biotechnology certificate and associate degree program is 180 students. This is projected to increase to a minimum of 250 students as a result of the new facilities. Funding for this expansion is not included in the 2008 Massachusetts Higher Education Bond Authorization. Following is a summary of how the proposed new facilities will positively impact MCC's capacity to graduate well qualified students.

**Class 10,000 Clean Room:** This 1,100 sq.ft. space will operate as a typical clean room environment in a biotechnology manufacturing facility. It will be adjacent to the gowning area and close to the laboratory to enable students to move easily from the laboratory to the gowning area and ultimately to the clean room. The current biotechnology lab is also used for other courses, such as Introduction to Biology and Molecular Biology. The labs associated with these courses conduct experiments that include carbohydrates, lipids, and live plant materials that contribute to contamination of biotechnology cell cultures. Additional factors contributing to contamination include dust and other particles that enter the lab space through both outdoor and indoor traffic. When the cell cultures are contaminated, both MCC students and faculty lose time decontaminating the lab and creating new cultures and the College must absorb additional expenses to replace the cell cultures' associated lab supplies. In addition, with the current facilities, students are only provided information on how to work in a clean room. They do not have the direct experience as part of their course work and many employers have suggested that this be integrated into the curriculum. The clean room will support hands-on training in all phases on the biotechnology manufacturing process through curriculum enhancements aimed at increasing students' knowledge of and competency in the following areas: clean room techniques, clean room gowning techniques, clean room operations and procedures, quality control, quality assurance and validation techniques, cGMP lab component, cGMP documentation development, analytical testing for quality control, raw material specification and inspection processes, information technology for biotechnology manufacturing, chromatography, advanced techniques in high performance liquid chromatography, SIP

(Sterilization in Place), CIP (Cleaning in Place), cell culture techniques, stem cell culturing, use of autoclaves, gel electrophoresis digital imaging, clinical trial design and management, and data management and analysis. The inclusion of a clean room, an integral part of the life sciences workforce environment, will enable the MCC Biotechnology Program to enhance education and training significantly, which will strengthen the preparation our students receive and make them more competitive as they enter the workforce.

**Gowning Area:** This 1,075 sq.ft. space will simulate the “dirty to clean” gowning procedures routinely used in cleanroom operations. It will be adjacent to the clean room, itself, and will act as the personnel “entrance” to the cleanroom. It will also be adjacent to the air lock entry to the clean room space.

**Combined Lecture Area and Non-Sterile Biotechnology Laboratory:** Currently, in addition not to having a clean room, there is not a dedicated biotechnology lecture space. Courses are scheduled in available classrooms, many of which are not on the same floor as the biotechnology laboratory. Thus, considerable time is lost as students and faculty move back and forth from the classroom to the laboratory, some lab materials become contaminated, and there are problems with breakage as materials are moved from one area to the other. Multitasking between two or more locations disrupts the education process.

The combined, dedicated lecture and non-sterile lab space will occupy 2,080 sq. ft. The laboratory will be used for a variety of experiments that do not require a “clean room” or aseptic environment. It will be located adjacent to the lecture space so that students can move easily from lectures to lab work and back again. It will also be close to the clean room space to ensure that experiments required for Methods of Biotechnology and Advanced Techniques in Biotechnology can be conducted in the appropriate environment. The laboratory, along with the clean room, will make it possible to house additional bioreactors, HPLC systems, autoclaves, a Coulter Counter, centrifuges and other equipment that will support course work. This will permit students to have much more extended time utilizing equipment, since individual units will not have to be shared by large groups of students, as is now the case.

**Dedicated Lab Prep Area:** A small laboratory prep area now supports all lab science courses, including biotechnology. Without a dedicated prep space, biotechnology lab materials can become contaminated and misplaced. It is difficult to monitor supply levels and the autoclave and dishwasher frequently require repair because they are used for all courses. All of this contributes to loss of important lab time and increased costs for additional materials. The dedicated 325 sq.ft. prep area will provide a centralized space for preparation of bulk media, purification materials and other similar material. It will be easily accessible to the laboratory space and the clean room.

**Bulk Storage Room:** This 480 sq.ft. space will house all bulk materials used in the laboratory and clean room. It will be close to the laboratory space and clean room to minimize the risk of spills and related injuries. It will feature floor to ceiling heavy duty shelving with sufficient space to store bulk materials on end, two to three cases high. The floor space will be sufficient to store bulk liquids. The floor covering and door closures will minimize contamination risks in the event of a spill or other accident.

## **B. Connection between training and intended audience of students and employers**

The planning phase workforce needs analysis included a review of the 2013 Massachusetts Life Sciences Industry Entry Level Employment Demand Report published by MassBioEd and MassBio, which described industry entry-level hiring plans. The report surveyed 49 industry participants with 30 in biotechnology, five in pharmaceuticals and the remainder in CRO (Contract/Clinical Research Organization), CMO (Contract Manufacturing Organization) and diagnostics. The survey asked 13 key questions to identify anticipated needs for new hires in the next 12 to 36 months, as well as degree preferences and preferred recruitment approaches. The highest projected number of hiring positions for

2013-2014 biotechnology associate degree graduates included research associate, manufacturing operator, manufacturing technician, clinical research administrator, laboratory technician, IT applications technician, quality assurance auditor, research assistant, IT Help Desk technician, document control, and quality control technician. The information in the report assisted in identifying areas where the MCC biotechnology curriculum can be enhanced to prepare our students for projected hiring positions.

MCC also communicates with employers on a regular basis through its internships and job placements, Advisory Board, and participation in the Parenteral Drug Association, which is comprised of more than 400 life sciences industry representatives. MCC faculty attend PDA meetings that, on average, involve 80-100 members. Employers who have recently accepted students for internships and/or employment include: Shire Human Therapy, Genzyme/Sanofi, Millipore, Lantheus Medical Imaging, Charles River Labs, Concert Pharmaceuticals, Novartis, New England Cryogenics, Foundation Medical, and Bio 2 Technology. While MCC's program is highly respected and holds the Gold Standard awarded by the Massachusetts Life Science Education Consortium, attendees at the PDA meetings and internship/employer contacts have all indicated that a clean room environment that supports the enhanced and/or additional training preparation described above will significantly increase the skills of our graduates and better position them for employment opportunities in the life sciences industry. Currently, most MCC graduates enter positions related to cell culture, buffer preparation and purification and a few are placed in quality control, quality assurance, and validation. With additional skills training, many more would qualify for these last three positions that many employers have suggested MCC prepare students to enter. These are also among the positions highlighted in the Demand Report described above.

**C. Description of any partnerships associated with the training, including how industry sponsor(s) will collaborate in the development and implementation of the program**

MCC will work with employer contacts, including those listed above, and its Biotechnology Advisory Board membership for input as current curriculum is enhanced and new curriculum developed. Current Advisory Board members include representatives from Biogen/Idec, Shire Pharmaceuticals, Pfizer, Genzyme/Sanofi, Novartis Institute for Biomedical Research, Inc., Kelly Scientific Resources, Corning Discovery Labware, Biomedical Laboratory of Boston University School of Medicine and Metropolitan College, and Minuteman Regional High School. The Advisory Board, which meets twice a year, will provide ongoing feedback on the curriculum development. The many well established partnerships that MCC has developed with life sciences businesses and organizations provide: important feedback on emerging industry needs and how MCC can prepare students to meet these needs; internship and employment placement opportunities for our students; and donations of equipment and supplies. Finally, as part of the construction of the new facility, MCC plans to seek financial and other types of contributions from several life sciences companies.

**D. If applicable, curriculum adaptation to meet the needs of industry**

As noted above, dedicated facilities will make it possible for MCC to offer the types of courses and training identified by our industry contacts and through the planning study as important for preparing well qualified students. In the past, MCC has responded to employer requests for short-term instruction in addition to that offered through the certificate and degree programs. This short-term instruction has included a one-week workshop on Human Embryonic Stem Cells for both incumbent workers and students, training for high school life sciences teachers, and participation in the BEST Biotechnology workforce training initiative. With the addition of a clean room, the College will be positioned to respond to even more to industry training requests.

**E. If applicable, description of any internship program related to the program**

All students are required to complete a 200 hour internship at a life sciences company. Four, 2.5 hours classes are also scheduled with the MCC Biotechnology Program Coordinator for students to share experiences about the work being completed during the internship and to discuss how to address any

challenges. Students submit weekly summaries of their work, write a final paper reflecting on their experience, and complete an evaluation form that includes an opportunity to make suggestions for enhancing the program. The internship provides the necessary industrial experience to prepare students for permanent employment in the life sciences industry. In addition, the MCC Coordinator of the Health and STEM Career Pathways Center works with biotechnology students to assist them in preparing resumes and applications that are submitted to the Massachusetts Life Sciences Center Internship Program. Several MCC students have been accepted for internships.

**F. Efforts, or plan, to evaluate the success of the program in tracking**

The Dean of Health and STEM will oversee the evaluation process in collaboration with the Science Department Chair and Biotechnology faculty. Through the MCC Office of Institutional Research (OIR), we are able to track number of students entering and completing the program, courses completed, number of graduates, and areas of certification/degree received as a result of training. The OIR also conducts a post-graduation survey as part of its reporting requirements for Perkins funding. Survey tools include mail, email, phone, and contacts by the Program Coordinator. The study focuses on employment placement, not retention. MCC will also track graduates through working with the Massachusetts Department of Higher Education (DHE). DHE and the Massachusetts Department of Labor (DOL) have a signed Memorandum of Understanding (MOU) that allows the DHE to track Massachusetts community college graduates into the labor market. The DHE currently tracks students at the segment and college level, but expects to be able to track students at the major level in the future. The DHE must satisfy all data confidentiality regulations contained in the MOU when reporting data back to the college, or any other entity. The fulfillment of these criteria requires a set minimum number of graduates that are able to be tracked by the DOL in each subcategory that will be reported. The program’s success will also be evaluated by obtaining formal feedback from employers who provide internships and/or hire MCC graduates. This feedback will focus on assessment of the performance skills and competencies students and graduates demonstrate in the workplace. All data and assessments will be reviewed annually and recommendations made for revision or enhancement of activities.

**III. Performance Measurement**

<b>Data Element</b>	<b>Biotechnology Certificate</b>	<b>Biotechnology Associate Degree</b>
Fall Enrollment Headcount- Fall -2013	27	153
Annual Enrollment – Academic Year 2013	28	198
Transfer- Based on Fall 2009 Enrollment		38%
Retention: Fall-2011 Cohort, Full-time, First- Time	100%	69%
Retention Spring-Fall 2011 Cohort, Full-Time, First-Time	100%	92%
Credit Course Completion- Fall 2012	86%	88%
Degrees- Fiscal Year 2013	33	34

**IV. Budget**

The total cost for this project is \$3,900,000, of which MCC is requesting \$3,000,000 in support from the Massachusetts Life Sciences Center. The College has committed to funding the remaining \$900,000 and will also solicit industry for additional contributions. **Reduced Funding:** In spring 2014, MCC will begin a \$3.5 million dollar HVAC project in the Talbot Building to upgrade critical infrastructure that is 20 years old and to ensure energy efficiencies. This project will impact all labs, including biology, chemistry, and biotechnology. Given the extent and expense of this project, combined with the \$900,000 commitment to the new biotechnology facility, MCC will not be able to proceed with the new biotechnology facility, if funding is reduced by either 25% or 50%.

Following is a detailed three-year breakdown for the overall cost for construction of the new facility:

	Item	BUDGET	Year 1	Year 2	Year 3
1	Construction Cost	1,916,000	-	766,400	1,149,600
2	Arch./Eng. Fee	230,000	46,000	138,000	46,000
3	Topographic Survey	-	-	-	-
4	Testing and Inspections	-	-	-	-
5	OPM & Clerk of the Works	182,500	20,000	76,500	86,000
6	Furnishings and Equip. (See breakout below)	550,000	-	-	550,000
7	Computer Technology	30,000	-	-	30,000
8	Tel/Data Installation	24,000	-	-	24,000
9	Separate Contract for Commissioning Agent to confirm HVAC for fifth floor	25,000	-	-	25,000
10	Reimbursable Expenses (printing and advertising associated with bid process)	2,000	-	2,000	-
11	Moving Cost (vacating fifth floor and moving in after construction)	20,000	-	10,000	10,000
12	Administrative Costs	-	-	-	-
13	Legal Fees	-	-	-	-
14	Bond Costs (required for general contractor)	30,000	-	30,000	-
15	Contingency (12.5% (YR1), 15%(YR2, YR3))	448,000	8,000	150,000	290,000
16	<b>Project Cost</b>	<b>3,458,000</b>	<b>74,000</b>	<b>1,173,000</b>	<b>2,208,000</b>
17	<i>Escalation Cost (5%/yr x 3 yrs)</i>	<i>472,000</i>	<i>4,000</i>	<i>120,000</i>	<i>348,000</i>
18	<b>Total Project Cost (2015-2016)</b>	<b>3,900,000</b>	<b>78,000</b>	<b>1,290,000</b>	<b>2,560,000</b>

Whenever possible, existing equipment and furnishings will be used in the new facility. However, there is a need for the following additional equipment and furnishings totaling \$550,000.

#### Lecture and Non-Sterile Lab Space

##### Equipment

HPLC systems	2	\$	45,000	\$	<b>90,000.00</b>
HPLC tables	3	\$	1,500	\$	<b>4,500.00</b>
Warm chamber (no CO2)	1	\$	4,000	\$	<b>4,000.00</b>
Serological centrifuges	3	\$	1,200	\$	<b>3,600.00</b>
Water purification system (Milli-Q)	1	\$	4,000	\$	<b>4,000.00</b>
Freezer with manual defrost	1	\$	5,339	\$	<b>5,339.00</b>
Hazardous material cabinets	2	\$	1,500	\$	<b>3,000.00</b>
Thermo Cycler (PCR Machine)	3	\$	10,000	\$	<b>30,000.00</b>
Mini-centrifuge	5	\$	300	\$	<b>1,500.00</b>
Electrophoresis power converters	3	\$	300	\$	<b>900.00</b>
Vertical Electrophoresis Chambers	2	\$	300	\$	<b>600.00</b>
6 unit Electrophoresis	1	\$	1,000	\$	<b>1,000.00</b>
Horizontal Electrophoresis Chambers	6	\$	500	\$	<b>3,000.00</b>
Platform Rocker large	2	\$	1,000	\$	<b>2,000.00</b>
Platform Rocker	6	\$	400	\$	<b>2,400.00</b>
			<b>Subtotal Equipment</b>	\$	<b>155,839.00</b>

**Lecture Space Furnishings**

White Board (14 ft x 5 ft)	1	\$	200	\$	<b>200.00</b>
Lecture podium	1	\$	500	\$	<b>500.00</b>
Student tables	12	\$	300	\$	<b>3,600.00</b>
Student chairs	24	\$	200	\$	<b>4,800.00</b>
<b>Subtotal Furnishings</b>				\$	<b>9,100.00</b>

**Clean Room Equipment**

Biological safety cabinets (48" self-contained)	8	\$	7,725	\$	<b>61,800.00</b>
Incubators	2	\$	3,800	\$	<b>7,600.00</b>
Serological centrifuges	3	\$	1,200	\$	<b>3,600.00</b>
Liquid nitrogen storage unit	1	\$	2,000	\$	<b>2,000.00</b>
Water bath 37 C	1	\$	800	\$	<b>800.00</b>
Water bath 56 C	1	\$	900	\$	<b>900.00</b>
Water bath variable temperature	1	\$	1,000	\$	<b>1,000.00</b>
Refrigerator	1	\$	1,100	\$	<b>1,100.00</b>
Freezer 20 cu ft -20 degrees C	1	\$	5,339	\$	<b>5,339.00</b>
Bioreactor	3	\$	76,000	\$	<b>228,000.00</b>
Ph meters	3	\$	300	\$	<b>900.00</b>
Peristaltic pump	2	\$	800	\$	<b>1,600.00</b>
<b>Subtotal Equipment</b>				\$	<b>314,639.00</b>

**Clean Room Furnishings**

Clean room tables	6	\$	2,180	\$	<b>13,080.00</b>
Clean room chairs	24	\$	424	\$	<b>10,182.00</b>
Flammable storage cabinet	1	\$	2,200	\$	<b>2,200.00</b>
Corrosive and acid storage cabinet	1	\$	1,600	\$	<b>1,600.00</b>
<b>Subtotal Furnishings</b>				\$	<b>27,062.00</b>

**Gowning Room Furnishings**

Storage cabinets for booties, coveralls, etc.	11		800	\$	<b>8,800.00</b>
Gowning benches 4ft each stainless steel	11		600	\$	<b>6,600.00</b>
<b>Subtotal Furnishings</b>				\$	<b>15,400.00</b>

**Prep Room Equipment**

Autoclave	1	\$	10,000	\$	<b>10,000.00</b>
Lab balance	2	\$	1,000	\$	<b>2,000.00</b>
<b>Subtotal Equipment</b>				\$	<b>12,000.00</b>

**Prep Room Furnishings**

Dish washer	1	\$	5,485	\$	<b>5,485.00</b>
Lab cart	3	\$	400	\$	<b>1,200.00</b>
<b>Subtotal Furnishings</b>				\$	<b>6,685.00</b>

**Bulk Room Furnishings**











32 linear feet of ceiling height industrial shelving	32	\$	110	\$	<b>3,520.00</b>
Miscellaneous Storage				\$	<b>5,755.00</b>
<b>Subtotal Furnishing</b>				\$	<b>9,275.00</b>
<b>Total Equipment and Furnishings</b>				\$	<b>550,000.00</b>

**Computer Technology**

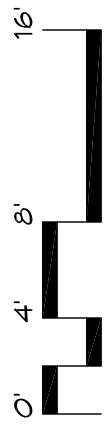
High performance medical PCs for clean room	6	\$	2,185	\$	<b>13,110.00</b>
Laptop computers for lab	24	\$	670	\$	<b>16,080.00</b>
Printers for clean room and lab	2		405	\$	<b>810.00</b>
<b>Total Technology</b>				\$	<b>30,000.00</b>



**LEGEND**

	LABORATORY		CORRIDOR
	LAB SERVICE		STAIRS/ELEVATOR
	OFFICE		PLUMBING / ELEC. / MECH. CORE
	STORAGE		
	EXISTING WALL		
	WALL TO BE DEMOLISHED		
	NEW WALL		

ALLEY



MIDDLE STREET

**1 Fifth Floor Plan with Biotech Facilities**

1/8" = 1'-0"