BOARD OF HIGHER EDUCATION

REQUEST FOR COMMITTEE AND BOARD ACTION

COMMITTEE: Academic Affairs **NO**: AAC 16-03

COMMITTEE DATE: October 20, 2016

BOARD DATE: October 27, 2016

APPLICATION OF UNIVERSITY OF MASSACHUSETTS LOWELL TO AWARD THE BACHELOR OF SCIENCE IN ENGINEERING IN BIOMEDICAL ENGINEERING

MOVED: The Board of Higher Education hereby approves the application of **University of Massachusetts Lowell** to award the **Bachelor of Science in Engineering in Biomedical Engineering.**

Upon graduating the first class for this program, the University shall submit to the Board a status report addressing its success in reaching program goals as stated in the application and in the areas of enrollment, curriculum, faculty resources, and program effectiveness.

Authority: Massachusetts General Laws Chapter 15A, Section 9(b)

Contact: Winifred M. Hagan, Ed.D.
Interim Deputy Commissioner for Academic and Student Success

BOARD OF HIGHER EDUCATION

July 2015

University of Massachusetts Lowell
Bachelor of Science in Engineering in Biomedical Engineering

INTENT AND MISSION

The proposed Bachelor of Science in Engineering in Biomedical Engineering (BSBME) is consistent with the mission of University of Massachusetts Lowell (UML) in providing an affordable and accessible education of high quality and to conduct programs of research and public service that advance knowledge and improve the lives of the people of the Commonwealth, the nation, and the world.

The intent of the program is to prepare students for biomedical engineering careers. These include the development of various diagnostics, imaging equipment, pharmaceutical and therapeutic biologics, as well as applications such as bio-manufacturing and manufacturing biopharmaceuticals. UML further intends that this program will increase relationships and collaborations between the sciences and health sciences on the UML campus. It is also intended that the UMass Medical School campus will engage in collaborations with the Biomedical Engineering and Biotechnology graduate program.

The proposed program has obtained all necessary governance approvals on campus and was approved by the University of Massachusetts Board of Trustees on April 8th, 2015. The required letter of intent was circulated on January 22nd, 2015. No comments were received.

NEED AND DEMAND

National and State Labor Market Outlook

The Bureau of Labor Statistics (BLS) forecasts that the employment of biomedical engineers is projected to grow 27 percent from 2012 to 2022, faster than the average for all occupations.[1] The BLS attributes this growth to an aging population that is likely to need more medical care as well as increased public awareness of biomedical engineering advances and the benefits resulting from those advances.

A market assessment, completed in May 2014 by Hanover Research[2], addressed the potential enrollment and labor market demand for an undergraduate biomedical engineering program with a particular focus on Massachusetts and New England. The report profiles several national and regional programs in biomedical engineering with a specific focus on department structures and specializations. Nationally, biomedical engineering is projected to add an average of 10,100 jobs each year from 2012-2022 and grow by 26.6 percent, more than twice the average growth rate across all career fields. It is anticipated that Massachusetts will experience a strong

[1] http://www.bls.gov/ooh/architecture-and-engineering/biomedical-engineers.htm
[2] http://www.hanoverresearch.com/solutions/industrial-manufacturing/market-assessment/manufacturing-market-trend-forecasts/

field with predicted employment of biomedical engineers expected to grow by 87.8 percent from 2010 through 2020.

Student Demand

UML reports that their College of Engineering (COE) has experienced a 59 percent growth in undergraduate enrollment over the past 5 years and interest in biomedical engineering among potential students is strong. Biomedical engineering is one of the fastest growing fields within engineering, and the number of bachelor's programs in the field has expanded rapidly in recent years. The increase in degree completions since 2008 and the career prospects for biomedical engineers suggest to UML that interest will remain strong and demand will support a sustainable program.

OVERVIEW OF PROPOSED PROGRAM

The proposed BSBME program is designed to prepare students for biomedical engineering development applications. This includes the development of various diagnostic and therapeutic devices, ranging from clinical equipment to micro-implants and imaging equipment such as, Magnetic Resonance Imaging (MRI) and Electroencephalogram (EEG). It is expected that graduates will be prepared to work for biomedical companies, especially those that develop, manufacture and distribute medical devices. It is also expected that those who complete of the bachelor degree program will be prepared for graduate study in biomedical engineering and related fields.

Duplication

UML reported a review of private and public universities in Massachusetts, which indicated that five private institutions are currently offering programs similar to the proposed BSBME. Among the private institutions, the B.S. in Biomedical Engineering is offered by Tufts, Worcester Polytechnic Institute, Boston University, Northeastern University, and Western New England College. UMass Dartmouth offers a broader degree in bioengineering but there is no undergraduate biomedical engineering degree program currently offered by public institutions.

ACADEMIC AND RELATED MATTERS

Admission

It is planned that students entering the proposed engineering program will be admitted under the general admission requirements of UML. If the program is approved, the student population is intended to be from 20-30 students for the Fall 2015 semester and would grow to accommodate a new cohort of about 25-50 students per academic year. UML anticipates that the program will have a mix of in-state, out-of-state and international students.

PROGRAM ENROLLMENT PROJECTION

	2015-16	2016-17	2017-18	2018-19
New Full-Time Students	20	25	25	25
Continuing Full-Time Students		20	45	70
New Part-Time Students				
Continuing Part-Time Students				
Totals	20	45	70	95

Curriculum (Attachment A)

The proposed BSBME curriculum consists of 126 credits through undergraduate courses. Courses are expected to be available in the fall, spring, and summer terms, allowing full-time students to complete the program in four calendar years. Program elective courses are devised to capture a variety of areas that are affiliated with biomedical engineering, often offered through various engineering disciplines. The initial track offered would be in medical device design and manufacturing. Elective choices will also facilitate a BSE/MS option, with the MS graduate program in Biomedical Engineering and Biotechnology (BMEBT).

RESOURCES AND BUDGET

Fiscal (Attachment B)

The proposed BSBME program is being developed subsequent to the BMEBT graduate program. Faculty teaching in that program as well as those that teach in other engineering programs at UML will be made available to teach in the proposed program. Additionally, one tenure-track electrical engineering faculty member was hired in FY2015 and the COE is searching for three more tenure-track faculty members in the area of biomedical engineering. It is expected that at least two more will be sought the following year, bringing the number of full-time faculty in the COE to 8 in addition to those affiliated with BMEBT. Together, this represents significant human resources for curriculum delivery.

Faculty and Administration (Attachment C)

A COE faculty member will serve as both the BSBME program coordinator and the professional capstone coordinator. Current COE administrative staff will provide administrative duties consistent with other COE undergraduate programs. The program coordinator, with administrative assistance as needed, will market the program, recruit students, and provide student advisement on administrative matters. BSBME faculty will serve as an admissions committee member similar to other COE programs. All curriculum development, review, modifications, and assessments will follow existing committee structures and processes, including the COE faculty and the Undergraduate Programs Committee.

With the development of a new lab, a technician will be hired for the program. It is expected that administrative support will be provided as the program grows. Until that time, UML plans for support to be provided by existing COE administrative staff.

Facilities, Library and Information Technologies

UML plans capital expenditures to include a lab retrofit ($250k) and equipment ($500k) for developing a "Makerspace" with tooling (3D printers, laser cutters, digitizers, CNC machines, etc.) that will allow for development of medical devices in the lab. The library at UMass Lowell has a significant number of online resources as well as campus-based collections and materials which are readily available and in place to serve student needs. All COE classrooms are technology-enhanced, including a PC computer, a SMART monitor with touchscreen, a laptop A/V hookup, lecture-capture video equipment, a VCR and/or DVD player, stereo speakers, a document camera, and an Extron control panel. All of the classrooms, labs, and common areas in the school are covered by wireless internet access.

UML has plans in place to develop a specific biomedical engineering laboratory in the renovation of Perry Hall, which is currently in the planning stage. Other laboratory classes will be carried out in the existing labs of other engineering programs.

Affiliations and Partnerships

The UMass Boston, Dartmouth, and Worcester institutions offer a joint Ph.D. degree program with UML in Biomedical Engineering and Biotechnology. It is expected that students in the proposed program may continue to earn the M.S. degree along a pathway toward the jointly offered Ph.D. program. Faculty from these programs will be made available to teach in the proposed program and help students see the possibilities of achieving advanced degrees during their careers.

PROGRAM EFFECTIVENESS

Goal	Measurable Objective	Strategy for Achievement	Timetable
1. Program enrollment	1.1. Attract high-quality applicants 1.2. Recruit applicants with strong technical skills as well as diverse and underrepresented students	1.1. Recruiting fairs; posters and flyers at schools and professional meetings; media advertising; web site 1.2. Actively recruiting engineering, management and technology UML graduates 1.3. Actively contacting local and regional companies to sponsor their employees into the BSBME program	3-6 months before admission, then ongoing
2. Professional advancement of students	1.1. Prepare students academically 2.2. Assist students in obtaining employment 2.3. Maintain student	2.1. Strong faculty and well-designed curriculum 2.2. Active involvement by Career Services Office; personal contacts	Prior to implementation and then ongoing

	contact and monitor student progress after graduation 2.4. Increase number and quality of employers recruiting BSBME students 2.5 Graduates increase their professional compensation	2.3. Newsletters, surveys, social events 2.4 Produce high-quality graduates with superior skills 2.5. Conduct annual alumni surveys, including compensation history	
3. Relevance of curriculum	3.1.Internal COE faculty approval 3.2 Approval of the COE Advisory Board 3.3. Compliance with professional organizations such as the national Center of Academic Excellence	3.1.Presented the proposal to the COE faculty as well as individual consultation with COE and MSB selected faculty and department heads 3.2. Present the proposal to the COE Advisory Board 3.3. Review of program implementation against the National Center standards on a yearly basis	3-6 months before implementation, then ongoing
4. Retention and Graduation	4.1 Higher retention rate of matriculating students [80%] 4.2 High Graduation rate [70%]	4.1 Recruit high-quality applicants with superior skill sets 4.2. Provide readily accessible and timely student advising	ongoing

EXTERNAL REVIEW AND INSTITUTIONAL RESPONSE

The proposed BSBME program was reviewed by Ruth Cheng, Ph.D., Director of Strategy & Innovation, Advanced Surgical Devices Division at Smith & Nephew Inc. in Andover MA, James Moriarty M.S., Director of Application Development at Vention Medical / Advanced Polymers in Salem NH, and Bruce Wheeler, Ph.D., Professor and former Chair, Biomedical Engineering at the University of Florida in Gainesville FL. The external review occurred on January 26, 2015. The report was submitted to UML on February 4, 2015.

The review team fully supported the establishment of the BSBME program at UML and members indicated that they expect the program will serve the needs of the Massachusetts biotechnology community by providing graduates who are prepared to make positive contributions to the field. The current curriculum was found to be sufficient to initiate the

proposed BSBME program, especially with the medical device focus that exploits existing entrepreneurial and applied research activities at UML and in the region.

The reviewers suggested specific course modifications and additions, noting that the substantial number of courses drawn from existing non-BME departments should be recognized as a short term advantage but a long-term risk to the proposed program. The review team strongly urged UML to conduct a long-term strategic plan to guide the development of curriculum, hiring of faculty, and the establishment of future tracks in the areas of imaging and bio-pharmacology.

UML agreed with the suggestions for curricular adjustments and plans to incorporate them into the respective courses. In response to the short-term and long-term concerns of the review team, UML indicated that COE is currently searching for three faculty to support the Biomedical Engineering program, in addition to the six faculty already on staff. It is also expected that three more biomedical engineering faculty searches will commence next academic year.

UML agreed with the reviewers' suggestion regarding long term strategic planning for the program and plans, if the program is approved, to hold a retreat focused on strategic planning. It is expected that a strategic planning retreat will address four topics: Assessment of current faculty expertise to guide future searches; define future potential tracks of study; consolidation of current courses to allow more curriculum flexibility and delineate differences between undergraduate and graduate offerings in similar technology areas

STAFF ANALYSIS AND RECOMMENDATION

Staff thoroughly reviewed all documentation submitted by the **University of Massachusetts Lowell** and the external reviewers. Staff recommendation is for approval of the proposed **Bachelor of Science in Engineering in Biomedical Engineering.**

ATTACHMENT A: CURRICULUM

BSE Biomedical Engineering

Required (Core) Courses in the Major (Total # courses required = 38)		
Course Number	Course Title	Credit Hours
16.201	Circuit Theory I	3
19.531	Occupational Biomechanics	3
25.107	Intro to Eng I	2
26.211	Engineering Mechanics	3
26.247	Thermodynamics	3
26.314	Fluid Flow	3
26.348	Heat Transfer	3
26.404	Process Control	3
26.418	Product and Process Design	3
22.473	Design Theory and Constraints	3
26.553	Medical Device Design I	3
26.554	Medical Device Design II	3
26.675	Biomaterials II	3
26.575	Biomaterials I	3
35.101	Anatomy & Physiology I	3
35.103	Anatomy & Physiology Lab I	1
36.450	Human Biochemistry	3
81.210	Biology for Engineers	1
81.212	Biology for Engineers Lab	3
84.121	Chemistry I	3
84.122	Chemistry II	3
84.123	Chemistry Lab I	1
84.124	Chemistry Lab II	1
84.204	Introduction to Organic and Polymer Chemistry	3
92.131	Calculus I	4
92.132	Calculus II	4
92.231	Calculus III	4
92.234	Differential Equations	3

92.386	Probability and Statistics I	3
95.141	Physics I	3
96.141	Physics Lab I	1
ENTR.300	Principles of Innovation and Entrepreneurship	3
IB.400	Introduction to Biomedical Engineering I	3
IB.xxx	Biomedical Engineering Lab I	1
IB.xxx	Biomedical Engineering II	3
IB.xxx	Biomedical Engineering Lab II	1
IB.xxx	Biomedical Capstone I	3
IB.xxx	Biomedical Capstone II	3
	Sub-Total Required Credits	**102**
Distribution of General Education Requirements		# of Gen Ed Credits
Arts and Humanities, including Literature and Foreign Languages (5 courses)		15
Mathematics and the Natural and Physical Sciences		
Social Sciences (3 courses)		9
Sub-Total General Education Credits		24
Curriculum Summary		
Total number of courses required for the degree		46
Total credit hours required for degree		126
List of Biomedical Gen Ed Courses		
42.101	College Writing I	3
42.102	College Writing II	3
49.201	Economics I (Microeconomics)	3
	Gen Ed (AH)	3
	Gen Ed (AH)	3
	Gen Ed (AH)	3
	Gen Ed (SS)	3
	Gen Ed (SS)	3

ATTACHMENT B: BUDGET

UMass New Program Approval Budget										
Campus: Lowell										
Program: BSE Biomedical Engineering										
REVENUE ESTIMATES										
	Year 1		**Year 2**		**Year 3**		**Year 4**		**Year 5**	
	2015		**2016**		**2017**		**2018**		**2019**	
Full-Time Tuition Rate: In-State	**1454**		**1454**		**1454**		**1454**		**1454**	
Full-Time Tuition Rate: Out-State	**8567**		**8567**		**8567**		**8567**		**8567**	
Mandatory Fees per Student (In-state)	**10993**		**10993**		**10993**		**10993**		**10993**	
Mandatory Fees per Student (out-state)	**18833**		**18833**		**18833**		**18833**		**18833**	
FTE # of New Students: In-State	**25**		**30**		**30**		**35**		**35**	
FTE # of New Students: Out-State	**5**		**10**		**15**		**15**		**15**	
# of In-State FTE Students transferring in from the institution's existing programs		**10**		**0**		**0**		**0**		**0**
# of Out-State FTE Students transferring in from the institution's existing programs		**0**		**0**		**0**		**0**		**0**
Tuition and Fees	**Newly Generated Revenue**	**Revenue from existing programs**	**Newly Generated Revenue**	**Revenue from existing programs**	**Newly Generated Revenue**	**Revenue from existing programs**	**Newly Generated Revenue**	**Revenue from existing programs**	**Newly Generated Revenue**	**Revenue from existing programs**
First Year Students										
Tuition										

In-State	$36,350	$14,540	$43,620	$0	$43,620	$0	$50,890	$0	$50,890	$0
Out-of-State	$42,835	$0	$85,670	$0	$128,505	$0	$128,505	$0	$128,505	$0
Mandatory Fees	$368,990	$109,930	$518,120	$0	$612,285	$0	$667,250	$0	$667,250	$0
Second Year Students										
Tuition										
In-State			$36,350	$14,540	$43,620	$0	$43,620	$0	$50,890	$0
Out-of-State			$42,835	$0	$85,670	$0	$128,505	$0	$128,505	$0
Mandatory Fees			$368,990	$109,930	$518,120	$0	$612,285	$0	$667,250	$0
Third Year Students										
Tuition										
In-State					$36,350	$14,540	$43,620	$0	$43,620	$0
Out-of-State					$42,835	$0	$85,670	$0	$128,505	$0
Mandatory Fees					$368,990	$109,930	$518,120	$0	$612,285	$0
Fourth Year Students										
Tuition										
In-State							$36,350	$14,540	$43,620	$0
Out-of-State							$42,835	$0	$85,670	$0
Mandatory Fees							$368,990	$109,930	$518,120	$0
Fifth Year Students										
Tuition										
In-State									$36,350	$14,540
Out-of-State									$42,835	$0

Mandatory Fees									$368,990	$109,930
Gross Tuition and Fees	$448,175	$124,470	$1,095,585	$124,470	$1,879,995	$124,470	$2,726,640	$124,470	$3,573,285	$124,470
Grants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Contracts	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campus budget allocation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Revenues (state appropriations, etc.)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$448,175	$124,470	$1,095,585	$124,470	$1,879,995	$124,470	$2,726,640	$124,470	$3,573,285	$124,470

UMass New Program Approval Budget

Campus: Lowell

Program: BSE Biomedical Engineering

EXPENDITURE ESTIMATES

	Year 1		Year 2		Year 3		Year 4		Year 5	
	2015		2016		2017		2018		2019	
	New Expenditures required for Program	Expenditures from current resources	New Expenditures required for Program	Expenditures from current resources	New Expenditures required for Program	Expenditures from current resources	New Expenditures required for Program	Expenditures from current resources	New Expenditures required for Program	Expenditures from current resources
Personnel Services										
Faculty	$200,000	$200,000	$400,000	$200,000	$400,000	$200,000	$400,000	$200,000	$400,000	$200,000
Administrators	$0	$12,000	$0	$12,000	$0	$20,000	$0	$20,000	$0	$20,000
Support Staff	$0	$20,000	$100,000	$20,000	$100,000	$20,000	$100,000	$20,000	$100,000	$20,000
Others	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fringe Benefits 28.86%	$57,720	$66,955	$144,300	$66,955	$144,300	$69,264	$144,300	$69,264	$144,300	$69,264
Total Personnel	**$257,720**	**$298,955**	**$644,300**	**$298,955**	**$644,300**	**$309,264**	**$644,300**	**$309,264**	**$644,300**	**$309,264**
Operating Expenses										
Supplies	$0	$0	$10,000	$0	$10,000	$0	$10,000	$0	$10,000	$0
Library Resources	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Marketing/Promotional Expenses	$10,000	$0	$10,000	$0	$10,000	$0	$10,000	$0	$10,000	$0
Laboratory Expenses	$0	$0	$20,000	$0	$20,000	$0	$20,000	$0	$20,000	$0
General Administrative Overhead	$0	$20,000	$0	$20,000	$0	$20,000	$0	$20,000	$0	$20,000

Other (specify)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Operating Expenses	**$10,000**	**$20,000**	**$40,000**	**$20,000**	**$40,000**	**$20,000**	**$40,000**	**$20,000**	**$40,000**	**$20,000**	
Net Student Assistance											
Assistantships	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Fellowships	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Stipends/Scholarships	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Student Assistance	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Capital											
Facilities / Campus recharges	$0	$0	$250,000	$0	$0	$0	$0	$0	$0	$0	
Equipment	$0	$0	$0	$0	$500,000	$0	$0	$0	$0	$0	
Other	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Capital	**$0**	**$0**	**$250,000**	**$0**	**$500,000**	**$0**	**$0**	**$0**	**$0**	**$0**	
Total Expenditures	**$267,720**	**$318,955**	**$934,300**	**$318,955**	**$1,184,300**	**$329,264**	**$684,300**	**$329,264**	**$684,300**	**$329,264**	

BUDGET SUMMARY OF NEW PROGRAM ONLY								
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**			
	2015	**2016**	**2017**	**2018**	**2019**			
Total of newly generated revenue	**$448,175**	**$1,095,585**	**$1,879,995**	**$2,726,640**	**$3,573,285**			
Total of additional resources required for program	**$267,720**	**$934,300**	**$1,184,300**	**$684,300**	**$684,300**			
Excess/ (Deficiency)	**$180,455**	**$161,285**	**$695,695**	**$2,042,340**	**$2,888,985**			
Justification of Financial Projections:								

ATTACHMENT C: FACULTY

Name of faculty member (Name, Degree and Field, Title)	Ten-ured Y/N	Courses Taught (C) = core course (OL)= course currently taught online	# of sections	Division or College of Employment	Full- or Part- time in Program	Full- or part-time in other department or program	Sites where individual will teach program courses
Barry, Carol Ph.D. Mathematics Professor	☒	26.314 Fluid Flow	2	College of Engineering	Full Time	No	Main Campus
Brent, Ronald Ph.D. Mathematics Professor	☒	92.133 Calculus III 92.134 Diff Eqns	2 2	College of Sciences	Full Time	No	Main Campus
Buchhotz, Bryan O., PhD, Bioengineering, Professor	☒	IB.400 Introduction to Biomedical Engineering I 19.531 Occupation Biomechanics	1 1	College of Health Sciences	Full Time	No	Main Campus
Choo, Johanna Ph.D. in Ecology Lecturer	☐	81.210 Biology for Engineers 81.212 Biology for Engineers Lab	1 2	College of Sciences	Full Time	No	Main Campus
Crugnola, Aldo Sc.D. in Mechanical Engineering Professor	☒	26.675 Biomaterials II	1	College of Engineering	Full Time	No	Main Campus
Danylov, Andriy Ph.D in Physics Lecturer	☐	95.141 Physics I 96.141 Physics I Lab	2 4	College of Sciences	Full Time	No	Main Campus
DeStefano, Paul Ph.D. Civil Engineering Lecturer	☐	14.286 Probability and Statistics for Engineers	1	College of Engineering	Full Time	No	Main Campus
Dulak, Arlee PhD in Cellular & Mollecular Pathology Lecture	☐	35.101 Human Anatomy and Physiology 35.103 Human Anatomy and Physiology Laboratory I	1 4	College of Health Sciences	Full Time	No	Main Campus
Gonzalez-Zugasti, Jennifer MS in Mathematics	☐	92.131 Calculus I 92.132 Calculus II	2 2	College of Sciences	Full Time	No	Main Campus
Hartman, Kevin Ph.D. Chemistry Lab Coordinator	☐	84.123 Chemistry I Lab 84.124 Chemistry II Lab	4 4	College of Sciences	Full Time	No	Main Campus
Huang, Jan Ph.D. in Chemical Engineering	☒	IB.xxx Biomedical Engineering Capstone I IB.xxx Biomedical Engineering Capstone II	1	College of Engineering	Full Time	No	Main Campus

Johnston, Stephen, PhD Plastics Engineering, Assistant Professor	☐	26.418 Product and Process Design	1	College of Engineering	Full Time	No	Main Campus
Kazmer, David Ph.D., Mechanical Engineering, P.E. Professor	☒	25.107 Intro to Engineering I 26.404 Process Control	1 1	College of Engineering	Full Time	No	Main Campus
Lai, Fang (Francis) Ph.D. in Chemical Engineering Professor	☒	26.211 Engineering Mechanics	1	College of Engineering	Full Time	No	Main Campus
MahD, Mufeed Ph.D. in Electrical and Computer Engineering Associate Professor	☒	16.411 Medical Diagnostic Imaging 16.460 Biomedical Instrumentation IB.xxx Intro to Biomedical Engineering II	1 1 1	College of Engineering	Full Time	No	Main Campus
Manohar, Sanjeev Ph.D. in Organic Chemistry Professor	☒	84.204 Introduction to Organic and Polymer Chemistry	1	College of Engineering	Full Time	No	Main Campus
McCarthy, Stephen, Ph.D. in Macromolecular Science Professor	☒	26.553 Medical Device Design I 26.554 Medical Device Design II IB.xxx Biomedical Engineering Lab I IB.xxx Biomedical Engineering Lab II	1 1 1 1	College of Engineering	Full Time	No	Main Campus
Nugent, Matthew Ph.D. in Biochemistry Professor	☒	81.419 Biochemistry	2	College of Sciences	Full Time	No	Main Campus
Shina, Sammy Ph.D., Mechanical Engineering, P.E. Professor	☒	22.473 Design Theory and Constraints	1	College of Engineering	Full Time	No	Main Campus
Sobkowicz-Kline, Margaret J. Ph.D. in Chemical Engineering Assistant Professor	☒	26.247 Thermodynamics 26.348 Heat Transfer 26.575 Biomaterials I	1 1 1	College of Engineering	Full Time	No	Main Campus
Sun, Yuyu Ph.D. in Polymer Chemistry and Physics Associate Professor	☒	84.121 Chemistry I 84.122 Chemistry II	2 2	College of Sciences	Full Time	No	Main Campus
Tello, Steven Ed.D. Leadership in Schooling Associate Professor	☒	ENTR.300 Principles of Innovation and Entrepreneurship	2	Manning School of Business	Full Time	No	Main Campus
Wang, Xingwei Ph.D. Electrical	☒	16.201 Circuit Theory I	2	College of Engineering	Full Time	No	Main Campus

Engineering Associate Professor		16.441 Intro to Biosensors	1				
Wilson, Thomas Ph.D. Biology Associate Professor	☒	36.350 Human Biochemistry	1	College of Health Sciences	Full Time	No	Main Campus
Yu, Hengyong Ph.D. in Information and Communication Engineering Associate Professor	☐	16.411 Medical Diagnostic Imaging	1	College of Engineering	Full Time	No	Main Campus
Summary of Visiting Faculty and Faculty on Administrative Assignment							
Santagate, Christine MS Management Adjunct Lecturer	☐	26.xxx Medical Device Development Regulation	1	College of Engineering	Part Time	No	Main Campus