BOARD OF TRUSTEES
UNIVERSITY OF THE DISTRICT OF COLUMBIA

UDC Resolution No. 2014-____

SUBJECT: Approval of Bachelor of Science in Biomedical Engineering Degree Program

WHEREAS, pursuant to D.C. Official Code § 38-1202.06(3), the Board of Trustees is authorized to establish or approve policies and procedures governing admissions, curricula, programs, graduation, the awarding of degrees, and general policy for the components of the University; and

WHEREAS, pursuant to DCMR § 08-B308.1, new associate, baccalaureate, and graduate degree programs may be added to the University curricula upon recommendation by the Academic Senate and the President and after approval by the Board; and

WHEREAS, Biomedical Engineering (BME) is projected to be one of the fastest growing occupations (based on U.S. Bureau of Labor Statistics) and, therefore, a high-demand profession in our region and nationally, which would not only benefit undergraduate students at UDC but will also provide students at the UDC community college and District of Columbia high school students an economical and continuous path for obtaining a post-secondary education in Biomedical Engineering; and

WHEREAS, University undergraduates earning a Bachelor of Science in BME (BSBME) will gain a strong interdisciplinary education that combines engineering analysis and design with physiology, (i.e., from the cellular level to entire biological systems), and graduates of this program will be prepared for engineering positions in industrial settings, as well as for advanced degrees in engineering, medicine, and other health-related disciplines, thus also serving as a precursor to those interested in pursuing a medical degree; and

WHEREAS, the University proposes an inter-disciplinary program that would be informed and enhanced by the collaboration, internally, of the School of Engineering and Advanced Sciences and the College of Arts and Sciences, and externally by regional and world-renowned institutions (such as the National Institutes of Heal, National Science Foundation, Johns Hopkins University, etc.); and

WHEREAS, the proposed curriculum has been designed to provide students with up-to-date advanced training in selected marketable specialties of Biomedical Engineering, Biological Sciences and other engineering related inter-disciplinary fields; and to prepare students for entry into research-based graduate studies (e.g., to obtain a M.S. or Ph.D. degree in BME) or medical school; and to prepare students for industrial career positions in both public and private sectors pertaining to medical-related fields; and to provide students the background and tools necessary to take the Fundamentals of Engineering (FE) examination (i.e., if the student wishes to attain registration as a Professional Engineer); and

WHEREAS, the Administration proposes to establish a BS in Biomedical Engineering (BSBME), based in the School of Engineering and Advanced Sciences, and the proposed program has been approved by all required levels of faculty and administration;

NOW THEREFORE, BE IT RESOLVED that the University of the District of Columbia is hereby authorized to implement the BS in Biomedical Engineering (BSBME) Degree Program in accordance with the attached proposal, *provided that* the funds required to implement the program shall not be obligated until they have been identified and reprogrammed within existing University resources.

Submitted by the Academic Affairs Committee November 6, 2014

Approved by the Board of Trustees

_____
Date

_____
Elaine Crider
Chairperson of the Board

UNIVERSITY OF THE DISTRICT OF COLUMBIA
1851

Office of the Chief Financial Officer

Donald L. Rickford
Chief Financial Officer

FISCAL IMPACT STATEMENT

TO: The Board of Trustees

FROM: Donald L. Rickford, Chief Financial Officer
Office of the Chief Financial Officer (UDC)

DATE: November 5, 2014

SUBJECT: B.S. Biomedical Program Proposal

Conclusion
The Office of the Chief Financial Officer of the University of the District of Columbia concludes that there is sufficient funding to support the implementation of the Bachelor of Science in Biomedical Engineering Degree Program Proposal.

Background
Biomedical Engineering (BME) is projected to be one of the fastest growing occupations (based on U.S. Bureau of Labor Statistics) and, therefore, a high-demand profession in our region and nationally.

The proposed BSBME curriculum has been designed provide students with up-to-date advanced training in selected marketable specialties of Biomedical Engineering, Biological Sciences and other engineering related inter-disciplinary fields; and to prepare students for entry into research-based graduate studies (e.g., to obtain a M.S. or Ph.D. degree in BME) or medical school. The proposed program has been approved by all required levels of faculty and administration.

Financial Impact
The proposed new academic program will be supported by existing faculty resources within the mechanical engineering department. In addition to the use of existing faculty resources to fund costs in years 1-3 of a 5 year plan, the program anticipates an increase in student FTE by 40 students by year 4. The financial plan also requires the existing 5 faculty members generate approximately $70,000 each in grant funds support per year. The Provost Office must monitor program milestones on an annual basis to determine continual viability of the program. The Office of the Chief Financial Officer anticipates some risks with this proposal. Risks will be mitigated with administrative oversight during the first three years of the program implementation with proper remediation of identified risks.

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RECEIVED
JUL 30 2014
VICE PRESIDENT FOR
ACADEMIC AFFAIRS

UNIVERSITY OF THE DISTRICT OF COLUMBIA
UNIVERSITY SENATE
ACADEMIC PROGRAMS
TRANSMITTAL FORM

TYPE OF REVIEW REQUESTED_____NEW PROGRAM_____

Department Chair — Date: Nov 15, 2013

Mechanical Engineering Curriculum Committee Chair — Date: Nov 15, 2013

College/School Curriculum Committee Chair — Date: 12/11/13

College/School Dean/Director — Date: 12/11/2013

University Senate ASPPC Chair — Date: 12/11/2013

University Senate President — Date: 12-11-2013

Provost — Date: 12/28/2014

University President (if required) — Date

Board of Trustees Chair (if required) — Date

Proposal for a New Undergraduate Program at UDC

Bachelor of Science in Biomedical Engineering (BSBME)

Department of Mechanical Engineering
School of Engineering and Applied Sciences
University of the District of Columbia
Washington DC

Proposed December 2013 (revised in August 2014)

UNIVERSITY OF THE DISTRICT OF COLUMBIA
UNIVERSITY SENATE
ACADEMIC PROGRAMS
TRANSMITTAL FORM

TYPE OF REVIEW REQUESTED_____NEW PROGRAM_____

_____

Department Chair Date

_____

College/School Curriculum Committee Chair Date

_____

College/School Dean/Director Date

_____

University Senate ASPPC Chair Date

_____

University Senate President Date

_____

Provost Date

_____

University President (if required) Date

_____

Board of Trustees Chair (if required) Date

Table of Contents

A. Review Type Requested – New Program

The Department of Mechanical Engineering within the School of Engineering and Applied Sciences at the University of the District of Columbia proposes the establishment of a new degree program: Bachelor of Science in Biomedical Engineering (BSBME).

B. Program Description

The primary mission of the Biomedical Engineering (BME) program is to train and prepare students to conceive and develop ideas, devices, and systems that improve human health and quality of life. By obtaining a degree in this program, students will gain the ability to think critically and apply scientific approaches, as well as engineering concepts, to solve medically-related problems.

Biomedical engineering is the application of engineering principles and design concepts to solve medical-related problems that affect human quality of life. Well-established specialty areas within Biomedical Engineering include the following: Biomechanics, Systems Physiology (e.g., modeling of biological systems), Biomaterials, Bioinstrumentation (e.g., development of medical devices), Clinical Engineering, and Rehabilitation Engineering. There are limitless examples of Biomedical Engineering "at work": the development orthopedic devices and drug delivery systems, the development of minimal invasive surgery techniques and devices, the advancement of noninvasive imaging technology, the design and implementation of non-invasive and invasive devices to aid in patient rehabilitation, and others. Through the application of engineering principles and design concepts to solve problems in medicine and biology, Biomedical Engineering provides a convergence of life sciences with engineering.

In order to meet the regional and national needs in the field of Biomedical Engineering, it is imperative that we provide the opportunity, as well as cultivate, the undergraduate students at the University of the District of Columbia (UDC) to pursue studies in this field. Some points are listed below:

- Increasing expectations of patients to maintain an active and healthy lifestyle has led to the demand for further development of new technology and health care in order to assist those with medical-related problems. Biomedical Engineering is projected to be *the fastest growing occupation* (e.g., 72% increase between 2008 and 2018 according to the Bureau of Labor Statistics).
- Biomedical Engineering is a rapidly advancing field, however the discipline still in its nascent stages. The proposed program allows students at UDC to pursue a BS degree in BME, a truly unique and interdisciplinary field, with a broad range of career options upon graduation. The students are offered even more "degrees-of-freedom" by the offering of a Pre-Medicine Option.
- The Metropolitan Washington DC region offers students and professionals unique opportunities to that few cities provide. This region is a "hotbed" for Biomedical Engineering research in that world-renowned institutions (e.g., National Rehabilitation Hospital (NRH), National Institutes of Health (NIH), National Science Foundation (NSF), and the Food & Drug Administration (FDA)) which are *all within close proximity to UDC*.

- An implemented BSBME degree program at UDC would hold tremendous market attraction to persons seeking a quality, economical alternative to existing BME programs in the greater DC area.

Thus, if the BSBME program is approved at UDC, students will be granted the opportunity pursue an education complementary to existing opportunities and resources available in the DC region.

Prior to submission of this proposal, several contacts have been made external to UDC as well as internally. If implemented, the BME program at UDC aims to interact with the following:

Externally

- National Institutes of Health (NIH) Clinical Center
- Johns Hopkins Hospital
- Massachusetts Eye and Ear Infirmary (MEEI), Harvard Medical School
- National Rehabilitation Hospital (NRH) Neuroscience Research Center

Internally

- College of Arts and Sciences
- The Institute of Gerontology
- Broader outreach (i.e., societal interactions with the high concentration of senior citizens near and around UDC)

These interactions will only further enhance the University, as well as the program and its students.

B.1 Student Outcomes

In order to make current and future UDC students responsive to the educational and technological demands of the rapidly-growing and advancing field of Biomedical Engineering, an undergraduate program in BME is necessary. To reach this goal, the main educational objectives of BSBME degree program are as follows:

- To provide students with up-to-date advanced training in selected marketable specialties of Biomedical Engineering, Biological Sciences and other engineering related inter-disciplinary fields
- To prepare students for entry into: research-based graduate studies (e.g., to obtain a M.S. or Ph.D. degree in BME) or medical school
- To prepare students for industrial career positions in both public and private sectors pertaining to medical-related fields
- To provide students with fundamentals of engineering and Biological Sciences to solve real-world problems in an interdisciplinary manner (e.g., via interactions with other existing program offerings at UDC)
- To provide students the background necessary, and hence the tools necessary, to take the Fundamentals of Engineering (FE) examination (i.e., if the student wishes to attain registration as a Professional Engineer)

A successful graduate of this program will have the ability to:

- Integrate core Mechanical and Electrical Engineering fundamentals, as well as, their knowledge of mathematics and natural sciences (e.g., Physics, Chemistry, and Biology) to solve medical-related problems
- Analyze and interpret experimental data
- Communicate effectively through oral and written presentations to colleagues, supervisors, other engineers, as well as the general public
- Solve technical problems both individually and as a member of an engineering team
- Pursue further education towards an advanced degree or contribute in industrial settings
- Understand the ethical requirements of the profession, the need for lifelong learning, as well as the impact of Biomedical Engineers on society

Undergraduates pursuing a Bachelor of Science in BME (BSBME) will gain a strong interdisciplinary education that combines engineering analysis and design with physiology, (i.e., from the cellular level to entire biological systems). Graduates of this program will be prepared for engineering positions in industrial settings (e.g., positions in biomedical and biotechnology industries), as well as for advanced degrees in engineering, medicine, and other health-related disciplines. Thus, this program also may serve as a precursor to those interested in pursuing a medical degree. Within the degree program, students have the option to pursue a four-year BSBME with or without a Pre-Medicine Option.

The proposed undergraduate program not only benefits undergraduate students at UDC, but will also provide students at the UDC community college and District of Columbia high school students an economical and continuous path for obtaining a post-secondary education in Biomedical Engineering. Due to its interdisciplinary nature, the BME program will enhance the existing programs within the School of Engineering and Applied Sciences (SEAS) and also the Biological Sciences within the College of Arts and Sciences.

B.2 Program Administration

The Director of the Biomedical Engineering Program will be responsible for the implementation and administration of the new BSBME degree program. The BME program will be within the Department of Mechanical Engineering and close collaboration will exist between the Director of the Biomedical Engineering Program and the Chair of the Department Mechanical Engineering. All requirements within the program will be in compliance with the undergraduate studies requirements of the academic policies of the University.

In the initial phase of the program, a Biomedical Engineering Committee will be formed which will be composed of primarily of faculty members from Mechanical Engineering, but also (potentially) faculty within Electrical Engineering, Computer Science, as well as Biological Sciences. The members of this Committee will be responsible for program development and periodic review of the program.

The Committee will formulate the curricular development, academic policy, guidelines, and requirements consistent with the other existing undergraduate programs and University policies. However, the day-to-day operations of the BSBME degree program will be the responsibility of the Director of the Biomedical Engineering Program.

The course work for each area of emphasis consists of a set of required core courses and a set of elective courses in Biomedical Engineering and other related fields. To integrate the technological advancement in the Biomedical Engineering discipline into the curriculum, members of the Committee may: 1) propose new courses, 2) modify course content of existing

courses, and 3) encourage enrollment in existing courses within (e.g., the Department of Biology, Chemistry and Physics, the Department of Psychology, Counseling and Human Development, and Speech and Hearing Biosciences) to satisfy BSBME course requirements. Proposals for adding new courses or curriculum changes to reflect the changing industry trends will be reviewed and recommended by the Committee. Recommendations for the addition of a new course or change of course content will then be presented to the entire Committee for formal review and approval. The University procedure for approving the addition of new courses or changing the contents of existing courses will be followed. After formal University review and approval, the course additions/changes will be entered into the appropriate academic catalog and the University's course inventory.

B.3 Advising

Each student admitted into the program can select an academic advisor in the ME Department. The student is held accountable for discussing any special needs they may have with his/her advisor. The advisor for each student is responsible for: 1) meeting with the student each term, 2) approving the course planning guide for that student, and 3) monitoring the student's work progress.

B.4 Admission procedures and standards

B.4.1 Undergraduate Admissions Application Procedures
The Office of Recruitment and Admissions is responsible for the timely and orderly processing of admission/re-admission applications for new, transfer, and returning students.

Most new students are admitted to the University of the District of Columbia for the fall and spring semesters, although some students may apply for admission during the summer term (See Admissions calendar for the exact dates). Secondary school students may apply for admission to the University any time following the completion of their junior year of high school.

- Students who have graduated, or will soon graduate, from an approved secondary school or who possess a valid General Education Development (GED) certificate and who have not previously enrolled in any postsecondary institution apply as Freshmen.
- The University of the District of Columbia maintains an open admissions policy to the University of the District of Columbia's Community College.
- Students who wish to be admitted into the University's Bachelor's Degree programs follow a selective admission criterion. Students who have been enrolled previously in another postsecondary institution apply as transfer applicants.
- Students not pursuing a degree at the University or who have received a degree from another institution may apply as non-degree students.
- Applicants who complete the application process by the deadline will receive written notification of their admission status from the Office of Recruitment and Admissions.
- The application form or online web application for admission, non-refundable application fee, official transcripts, and all other required documents must be submitted by the application deadline for the semester in which the applicant wishes to enroll. All documents become the property of the University of the District of Columbia's Office of Recruitment and Admissions.

- Submission of an application certifies that all information given is complete and accurate; applicants agree to abide by all the rules and regulations of the University. The penalty for falsifying any information or intentional omission of information may lead to refusal of admission or dismissal from the University.

For additional detailed information on University rules and regulations regarding application procedures, either the UDC Course Catalog should be referred to or Office of Recruitment and Admissions should be contacted.

B.4.2 Admission Standards

First-time-in-college (FTIC) applicants interested in admission to a bachelor's degree in BME must have earned a high school diploma, or equivalent, and meet the following minimum academic standards:

- Earned a 2.5 high school GPA and a 1200 SAT or 16 ACT Score or earned a 2.0 high school GPA and 1400 SAT or 19 ACT Score
- FTIC applicants who do not meet the above requirements may still be eligible for admission to the Flagship if they achieve minimum scores on the ACCUPLACER examination sub-tests as follows: English Score: 86 Mathematics Score: 85 Reading Score: 78
- FTIC applicants who have been out of school for over 3 years and have never taken the SAT or ACT, are generally admitted to the Flagship if they have achieved a minimum 2.5 High School GPA. These students are encouraged to submit ACCUPLACER scores to UDC to assist the office with the application review and admissions decision.
- In order to meet admission requirements, home-schooled students are required to submit passing scores
- A freshman applicant must submit the application for admission, the non-refundable application fee, and an official transcript of all high school coursework and grades. The transcript must reflect the date of graduation and must be mailed directly to the Office of Recruitment and Admissions by the applicant's secondary school. The application is not complete until all documents are received.

The University of the District of Columbia maintains an open admissions policy to the University of the District of Columbia's Community College, and students at the Community College are encouraged to apply.

B.4.3 General Degree Requirements

The total number of college level course credits required to graduate is 125. All technical electives must have prior departmental approval. A minimum grade of "C" is required for each core course, and a grade point average of 2.00 is required in major (or core) courses.

B.5 Program course descriptions and curriculum

The proposed undergraduate curriculum (Section B.5) begins with core courses, similar to that of the existing Mechanical Engineering program. Students within the program build their foundations in Engineering, Mathematics, Chemistry, Physics, and Biology. During freshman and sophomore years, students complete preparatory courses in Mathematics (e.g., Calculus

and Differential Equations), Science (e.g., Physics and Biology), as well as introductory courses in Electrical Engineering. In their junior year, students are exposed to Human Anatomy and Physiology, Thermo-fluids, and Bioinstrumentation. In the senior year, students will be exposed to professionals working in the field of BME via the Biomedical Engineering seminar. To further this experience, seniors are required to take three BME technical electives and also to participate in a BME-focused Capstone design project. The design project will be either indirectly or directly related to solving an existing medical-related problem.

In order to achieve sustainability in its early stages of matriculation, the proposed BME program follows a track similar to the existing Mechanical Engineering program for the freshman and sophomore years. The course outline for BSBME program is summarized in Table B.5.1.

Table B.5.1 BSBME Curriculum

FIRST SEMESTER – FALL SEMESTER

Course #	Course Name	credits
IGED-110	Found Writ Arts & Hum	3
IGED-130	Found Oral Comm.	3
CHEM-111	General Chemistry I Lec	3
CHEM-113	General Chemistry I Lab	1
MATH-151	Calculus I Lec	3
MATH-155	Calculus I Lab	1
CCEN-101	Intro to Engineering (modify to include BME)	2
	Total	16

SECOND SEMESTER – SPRING SEMESTER

Course #	Course Name	credits
IGED-111	Found Writ Soc. & Nat Sc.	3
MATH-152	Calculus II Lec	3
MATH-156	Calculus II Lab	1
PHYS-201	University Physics I Lec	3
PHYS-205	University Physics I Lab	1
MECH-105	Comp Aid Grap. Lec & Lab	3
	Total	14

THIRD SEMESTER – FALL SEMESTER

Course #	Course Name	credits
PHYS-202	University Physics II Lec	3
PHYS-206	University Physics II Lab	1
CVEN-201	Engineering Mechanics I	3
MECH-205	Materials Science (with Biomaterials topics)	3
CSCI-135	Scienf. Prog (Lec & Lab)	3
ELEC-221	Electric Circuits I Lec	3
ELEC-223	Electric Circuits I Lab	1
	Total	17

FOURTH SEMESTER – SPRING SEMESTER

Course #	Course Name	credits
MATH-254	Differential Equations	3
MECH-202	Engineering Mechanics II	3
BIOL-101	Biological Science Lec	3
BIOL-103	Biological Science Lab	1
MECH-208	Thermodynamics	3
MECH -222	Eng. Measurements Lec	3
MECH -223	Eng. Measurements Lab	1
	Total	17

FIFTH SEMESTER – FALL SEMESTER

Course #	Course Name	credits
IGED-210	Discov Expos Writing	3
MATH-153	Calculus III Lec	3
MATH-157	Calculus III Lab	1
MECH-381	Microcontrollers in ME	3
MECH-321	Fluid Mechanics Lec	3
MECH-322	Thermo/Fluid Lab	1
BIOL-111	Human Anatomy and Physiology Lec	3
BIOL-113	Human Anatomy and Physiology Lab	1
	Total	18

SIXTH SEMESTER – SPRING SEMESTER

Course #	Course Name	credits
Course #		
IGED-270	Discov Loc/Glob Cul	3
CVEN-308	Appl. Num Analysis	3
MECH-351	Heat Transfer Lec	3
BME-301	Bioinstrumentation	3
MECH-371	Design of Control Sys Lec	3
MECH-373	Design of Control Sys Lab	1
BME-302	Biomedical Seminar	1
	Total	17

SEVENTH SEMESTER – FALL SEMESTER

Course #	Course Name	credits
IGED-280	Discov Civ/Ser/Team	3
MECH-406	Engineering Economics	3
ELEC-307	Probability and Statistics for Engineers	3
BME-303	Biomedical Seminar	1
BME-491	Capstone Sr. Design Proj I*	3
BME-xxx	**BME Technical Elective	3
	Total	16

EIGHTH SEMESTER – SPRING SEMESTER

Course #	Course Name	credits
BME-304	Biomedical Seminar	1
BME-491	Capstone Sr. Design Proj II*	3
BME-xxx	**BME Technical Elective	3
BME-xxx	**BME Technical Elective	3
	Total	10
GRAND TOTAL CREDITS		**125**

Text color	*Description*
	Courses currently offered in existing ME curriculum
	Courses currently offered at UDC outside of current ME curriculum
	Courses to be developed within the ME Department for the BME program

Table B.5.2 displays the core courses for the BSBME program. BSBME technical electives will include those from existing programs or developed within the BME program by the ME faculty. The program is highly viable and allows for positive and mutually beneficial interdisciplinary interactions within the University in that there is potential for existing courses at UDC to be included in the program. However, since the curriculum only requires three BME technical electives, it will not pose a strain on the existing programs at UDC. Furthermore, three to five BME technical electives will be created within the Mechanical Engineering Department specifically for this program. Also, additional new course (SimuCase for Speech Pathology) will be developed between the College of Arts and Sciences and the Department of Mechanical Engineering.

It is highly encouraged that the student enrolls in three (related or sequential) technical electives that are related to their particular BME area of interest. Further encouraged (but not required) is participation in a BME Capstone Design project that coincides with the technical electives taken by the student. Students pursuing the BSBME Pre-Medicine Option will have similar core courses to that of the "regular" BME track. However, BSBME Pre-Medicine students can take technical electives that have a strong clinical component within, for example, the College of Arts and Sciences so long as they satisfy the pre-requisites and have permission from the course instructor. Detailed syllabi for the new courses are shown in Appendix A.

Table B.5.2 BSBME Core Courses (Outside of ME Curriculum)

Program	Course Name	Description
BIOL	**Biological Science Lecture/Lab**	BIOL 101 Biological Science I Lecture (3) Introduces the concepts of modern biological principles, with emphasis on the physical and chemical basis of life processes. Lec. 3 hrs. CR: BIOL 103.
		BIOL 103 Biological Science I Laboratory (1) Focuses on the experimental principles of the physical and chemical processes of life. Lab 3 hrs. CR: BIOL 101.
BIOL	**Fundamentals of Human Anatomy and Physiology I Lecture/Lab**	BIOL 111 (3) Focuses on the human body as it relates to function, organization, and interrelationship of body structures as these form
		BIOL 113 (1) Examines the cellular, tissue, and organ levels of the organization of the human body and how these units coordinate activities and function in the living organism. Lab 3 hrs. CR: BIOL 111.
BME	**BioInstrumentation**	BME 301 (3) This course provides an overview of several common medical instrumentation platforms. This includes introduction to the following: data aquisition of physiologic signals (including digital filtering and processing), biomedical sensors, and biomedical instrument design. PR: ELEC 221, 223, PHYS 201/205, and PHYS 202/206
BME	**BME Seminar**	BME 302, 3, 4 (1) This course exposes students to several topics relevant to current medical-related problems and technologies. This course includes journal discussions and readings as well as guest lecture presentations. Pre-reqs: None
BME	**BME Capstone Design Project**	BME 491, 2 (3) Senior level design projects with medical-related focus.
Regular ME-track courses first 3 semesters not listed here		

Table B.5.3 BSBME New Technical Electives

Program	Course Name	Course Description
BME	**Fundamentals of Biomaterials**	BMED 401 (3) This course develops the necessary engineering skills used to solve challenges in biomaterials and tissue engineering. This course includes fundamental material science, chemistry, and biology with focused biomaterial applications. Mechanical Properties of Soft and Hard Tissue. PR: General CHEM 111/113, CVEN 205/206, MECH 205
BME	**Biological Measurements: Imaging and Microscopy Methods in Biological Systems**	BMED 402 (4) This course presents the foundations of modern medical imaging in a systematic program structured as follows: imaging principles, imaging mathematics, imaging physics, and image generation techniques. Theory and techniques are illustrated in a direct hands-on approach in eight computer laboratory sessions that are topically synchronized with the course lectures. PR: BIOL 101/103, PHYS 201/205, PHYS 202/206
BME	**Biomedical Devices and Design**	BME 403 (3) A combined academic and industry taught course educating students on project definition, as well as the development and technology transfer of potential biomedical products in the context of the student's project. Lectures will be provided by various members of the BME faculty. Students will learn best practices for bioengineering device development including: product development via design and process control, intellectual property and innovation in biomedical engineering (including patents), and clinical regulatory issues, including clinical trial design. Faculty will provide case study examples.
BME	**Introduction to Physiological Systems Analysis**	BME 404 (3) A survey of systems theory with applications and case studies from bioengineering and physiology (e.g., nerve function, muscle dynamics, cardiovascular regulation, physiologic feedback control systems, properties of muscle, cardiovascular function). Analysis include: differential equations, linear and nonlinear systems, stability, time and frequency domain methods, feedback control, and biological oscillations. PR: MATH151/155, MATH 152/156, and MATH 254
BME	**Biomechanics**	BME 405 (3) Biomechanics is the study of the structure and function of biological systems by means of the methods of mechanics. Biomechanics using traditional engineering sciences (e.g., continuum mechanics, mechanism analysis, structural analysis, kinematics and dynamics) to study biological systems. PR: CVEN 201, MECH 202, BIOL 111/113
BME	**SimuCase in Speech Pathology**	BME 406 (3) SimuCase (speechpathology.com) is a simulated case study application to support best practices in clinical speech-language pathology. The user will practice assessment methods while interacting with virtual clients, family members, and professionals referred to as collaborators. By asking the right questions, collaborating with appropriate professionals, using proper assessment tools, and interpreting data, the user can make a diagnosis, write recommendations, and send a report. These simulations are blended with faculty instruction to allow practice in a safe, nonthreatening environment and that allows the student to build knowledge, skill, and professional judgment.

C. Program Feasibility

C.1 Demonstration of need (including internal and external supporting data)

- Biomedical Engineering is projected to be *the fastest growing occupation* (e.g., 72% increase between 2008 and 2018 according to the Bureau of Labor Statistics). The increasing expectations of patients to maintain an active and healthy lifestyle has led to the demand for further development of new technology and health care in order to assist those with medical-related problems.
- Biomedical Engineering is a rapidly advancing field, however the discipline still in its nascent stages. The proposed program allows students at UDC to pursue a BS degree in BME, a truly unique and interdisciplinary field, with a broad range of career options upon graduation. The students are offered even more "degrees-of-freedom" by the offering of a Pre-Medicine Option.
- The Metropolitan Washington DC region offers students and professionals unique opportunities to that few cities provide. This region is a "hotbed" for Biomedical Engineering research in that world-renowned institutions (e.g., National Institutes of Health (NIH), National Science Foundation (NSF), and the Food & Drug Administration (FDA)) are *all within close proximity to UDC*. Thus, if the BSBME program is approved at UDC, students will be granted the opportunity pursue an education complementary to existing opportunities and resources available in the DC region.
- An implemented BSBME degree program at UDC would hold tremendous market attraction to persons seeking a quality, economical alternative to existing BME programs in the greater District of Columbia (DC) area. Most of the DC area BME programs offered (e.g., at Catholic University (tuition is ~ $17,780/term) and Johns Hopkins University in Baltimore (tuition is ~ $45,470/year)) are exclusive in that they are prohibitively expensive in comparison to UDC (~$3318/term for residents). Therefore, offering a BME program at UDC would attract a significant number of students that require a more affordable option.
- Employment projections continue to show an increase in science, technology, engineering and Mathematics fields (STEM); especially in Washington, D.C. region. Employment projections in STEM fields appear promising. The U.S. Department of Labor has predicted a 29 percent increase in STEM jobs, adding about 2.1 million new jobs between 2010 and 2020. Washington, D.C. region has more than two times the concentration of STEM jobs than the national average.
- The availability of undergraduate programs in the BME department will enhance existing undergraduate BS programs and increase the visibility of the department and improve its academic ranking. This will help attract highly qualified faculty and undergraduate students to the Department and School of Engineering and Applied Sciences (SEAS).

C.2 Effect on student development

The interdisciplinary nature of the Biomedical Engineering program would have a positive effect on:

- The development and employability of students

- The development of inter-program interactions (e.g., within the College of Arts and Sciences, the Institute of Gerontology and others at UDC)
- Interactions with neighboring institutions (e.g., National Institutes of Health (NIH) and National Rehabilitation Hospital (NRH)).

Such interactions will deepen student learning and research experience, increase student morale, and ultimately increase student enrollment. These experiences are aligned with a main the goal of the BSBME program (i.e., that students will gain the skills and experiences necessary to succeed in a competitive and demanding work environment). In addition, the BME program would improve both student and faculty productivity and the probability of winning competitive teaching and research grants to further enhance both the program and the institution.

C.3 Students immediately affected

Mechanical Engineering undergraduates enrolled in the four- year BS that are prior to their junior year may be positively affected in that they will also receive the benefit of a BME transfer option. Also affected, are the incoming Engineering and Biology students (including those transferring from the community college), as well as those currently enrolled in SEAS programs and are prior to their junior year.

In summary, enrollment in the UDC BSBME program would be drawn from several sources:

- Currently enrolled UDC undergraduate Mechanical Engineering students (prior to their junior year),
- Currently enrolled UDC undergraduate Electrical and Computer Science (prior to their junior year)
- Other engineering (or non-engineering) BS degree holders seeking a career change
- Undergraduates transferring from the UDC community college
- International students who are interested to purse a degree in BME

An initial entering class of 10 to15 qualified and highly motivated students drawn from the above pool of potential applicants can be considered as a realistic enrollment target for the first year of the BSBME program. The impact of a SEAS BSBME program will have a dramatic effect on undergraduate recruitment.

C.4 Adequacy and appropriate qualification of current faculty and support staff

The program will initially depend upon the appropriately qualified faculty members in the primary areas of this program. The current faculty of the ME department have the qualifications and course offerings necessary to successfully initiate the program. BSBME students will be encouraged to take elective courses within the Mechanical Engineering Department. Furthermore, there is potential to interface BME technical electives with existing courses at UDC in other departments.

The program's faculties are nationally recognized Mechanical and Biomedical Engineering educators and researchers. However, as the program grows it will require at least one or two additional full-time, permanent faculty members. Furthermore, adjunct faculty will be hired to: 1) to broaden future course offerings and to take advantage of the specialized Biomedical

Engineering expertise found in the Washington DC and Baltimore metropolitan areas and 2) to expose our students to professionals working in the field, and expose potential employers to our future graduates.

C.5 Adequacy of current facilities (e.g., offices, classrooms, and labs)

The current department facilities shared by SEAS and other program square footage (dispersed through buildings 32 and 42) will be adequate to support the program in first year. However, as the program expands and grows in enrollment additional space will be needed for lecture room and additional laboratories. Currently, there are two labs (i.e., the Microfabrication Laboratory and Biomedical Engineering Laboratory) are being developed and furnished specifically for this program. These labs will be used for both educational and research purposes. Partnerships with (e.g., at the National Rehabilitation Hospital (NRH), Catholic University, the National Institutes of Health (NIH)) may allow for use of existing facilities.

C.6 Adequacy of supplies and equipment (Identification of additional needs)

The expected increase in enrollment will require the acquisition of additional software licenses, laboratory equipment, more office supplies, as well as teaching and research materials.

C.7 Estimated costs, available funds and probable funding sources

In addition, the proposed Biomedical Engineering Program expects external funding from federal agencies (e.g., Defense Advanced Research Projects Agency (DARPA), National Institutes of Health (NIH), National Science Foundation (NSF), Department of Defense (DoD)) and industries after the successful implementation of the program.

As student enrollment increases, additional full-time faculty and resources will be needed for the Biomedical Engineering program.

C.8 Avoidance of duplication or overlap with existing courses or programs

The BME program will not duplicate any other program or courses currently offered at UDC.

C.9 Relationships with Other UDC Programs

The interdisciplinary nature of the BME program will enhance collaborative activity with other disciplines at UDC. Through multidisciplinary research activities, the proposed BME program will complement and help strengthen other programs not only within the SEAS but also other programs within the University. The BME program will have the same synergistic relationships with existing UDC programs such as, but not limited to: SEAS (i.e., the Department of Mechanical Engineering, the Department of Electrical Engineering, the Department of Computer Science), the College of Arts and Sciences, the Institute of Gerontology, and potentially others.

C.10 Standards of relevant accrediting agencies and/or professional societies

The undergraduate BME program proposed herein is modeled after existing ABET accredited programs.

C.11 Congruence with academic unit objectives and university mission

The UDC Strategic Plan is structured around goals that lie in the intersecting arenas of learning, scholarship and community service. The proposed program will support goals in each of these arenas and intersections. In the arena of learning it will promote advanced Biomedical Engineering education and will help students develop critical thinking and advanced professional skills that will make them more competitive in career placement. In the arena of scholarship it will aid students in developing skills to support faculty in meeting the goals of using advanced science, engineering and technology innovation in various dimensions of scholarship. In the arena of service it will, by supporting outreach activities and serving minority Biomedical Engineering students, address the needs of DC residents. It will rise to meet the obligations of only urban land-grant University of the nation.

The proposed program will also create an opportunity for learning and research activities in the area of Biomedical Engineering. It will provide a synergistic effect on the other programs within the school as well as other programs at UDC.

In addition to meeting University and SEAS goals related to interdisciplinary collaboration, and scholarship, the BME program will also meet more specific department goals. To this end, it will support the goal of integrating instructional, research and outreach efforts. Since engineering entails analysis and solution of real-world problems, the program will promote the departmental goal of focusing its scholarship on the real-world applications to address the needs of medical-related problem-solving and technologies.

APPENDIX A: Syllabi of (New) Proposed Courses

A.1 Proposed Core Courses

A.1.1 Biomedical Instrumentation (BME 301)

Lecture: 2 sessions, 1 hour each per week
Lab: 1 session, 2 hours per week
Textbook: *None, we will use powerpoints and pdf's posted throughout the semester*
References:

1. *Medical Instrumentation: Application and Design.* John G. Webster, Ed.; 4th edition, Wiley, New York, 2010
2. *The Art of Electronics* by Horowitz and Hill

Grading:

Lab Reports, Homework, Projects 60%
Midterm Exam 15%
Final Exam 15%
Participation 10%

Course Prerequisites: ELEC 221/223, PHYS 201/205, PHYS 202/206

Course Description:
This course introduces biomedical instrument instrumentation and design. We will review several common medical instrumentation platforms. During the lecture portion of the course, we will cover theoretical components and background. During the laboratory portion of the course, we will use instrumentation to collect then analyze data.
More specifically, during the laboratory component of the course we will:

- Explore hands-on implementation of key principles of instrumentation
- Record physiological signals (e.g., electromyographic signals from activated muscles, shifts in center-of-pressure for a standing person, and kinematic data for both standing posture and gait)
- Explore different types of biomedical sensors, as well as cover basic concepts for analog signal amplification and filters, digital acquisition, digital filtering and processing.

Course Goals:
Students will understand the design considerations in biomedical instrumentation and capabilities of the most common sensors, conditioning, processing. They will also learn analysis methods needed to design and fabricate biomedical instrumentation.

Class and Laboratory Policies:
Students must be present for all lab sessions. For lab sessions, students will work in groups of 2-3 people. In addition to the lab, there will be several in-class assigned problems that will help to prepare for the next lab. To test the material learned in both the lecture and the lab, there will also be midterm and final exams.

Each group will submit one laboratory report 1 week following their laboratory session. Late assignments will be given a zero. Any special circumstances discussed with the instructor prior to the due date.

A.1.2 BME Seminar Series (BME 302, 3, 4)

Lectures: 1 session / week, 2 hours / session

Course Description:
The purpose of the seminars is to expose BME students to an array of topics related to BME via guest speaker lectures, case studies, and interactive small group discussions. Each semester's series is scoped toward a different topic in BME, resulting in a cycle that covers: medical ethics, research conduct, written and oral technical communication, and other medical-related topics and issues. Knowledgeable faculty and professionals in the field are BME are invited to present interactive and informative workshops to expose the student to potential topics of interest.

Each term has 9 scheduled sessions and BME students are required to enroll for 3 terms. This term's topics are focused on BME jobs and the interviewing process. The session titles are listed below:

Ses #1: Why your work is important! How does BME impact the world around us

Ses #2: BME Jobs in Industry (guest panel)

Ses #3: BME Jobs in Academia (guest panel)

Ses #4: Introductory workshop on CVs.

Ses #5: You applied for that dream job, and you got an interview. Good job! Now what?

Ses #6: And then, you have to give a job talk! (Tips on giving a successful presentation)

Ses #7: Your Job Talk went well BUT that's not the end of your on-campus interview! Tips for the on-site interview

Ses #8: Conflicts within the workplace: Tips on how to deal (invited speaker)

Ses #9: Student end-of-term presentations

Class Policies:
Students are not allowed to have > 2 unexcused absences. Students are also expected to write a 5 page term paper on a BME topic of choice and to give an in-class presentation on that topic at the end of the term.

Grading: P/F

A.2 Proposed Technical Elective Courses

A.2.1 Fundamentals of Biomaterials (BME 401)

Lecture: 2 sessions, 1 hour each per week

Lab: 1 session, 3 hours per week

Textbook: *Biomaterials Science* - Ratner, Hoffman, Schoen, Lemons (Elsevier; ISBN 0-12-582461)

References:
1. *Biomaterials* - Temenoff and Mikos (Pearson Prentice Hall; ISBN 0-13-009710-1)
2. *Materials Science and Engineering: An Introduction* - Callister (John Wiley and Sons; ISBN 0-471-13576-3)
3. *Science and Engineering of Materials* - Askland and Phule (Thomson; ISBN 0-534-55396-6)
4. Any Organic Chemistry Text book

Course Prerequisites: CHEM 111/113, CVEN 205/206, MECH 205

Course Description:
The primary objective of this course series is to teach the chemistry and engineering skills needed to solve challenges in the biomaterials and tissue engineering areas. For each section, the course instructor will provide the following: a theoretical description of the relevant phenomena, give examples of experimental measurements, highlight specific applications, and discuss the physiological requirements/relevance. This course is structured around classical topics in mechanics of materials and their application to study of the mechanical behavior of, for example, skeletal tissues, whole bones, bone-implant systems, and diarthroidal joints. Topics include:

- mechanical behavior of tissues (anisotropy, viscoelasticity, fracture and fatigue) with
- emphasis on the role of the microstructure of these tissues; structural properties of whole bones and implants (composite and asymmetric beam theories)
- mechanical function of joints (contact mechanics, lubrication and wear), for example, related problems related to aging, disease, and injury.

There will also be a weekly laboratory section that will cover principles of bio-interface science and technology.

Course Objectives:
After successfully completing this course, students will be able to:

- Understand the fundamental principals in biomedical engineering, material science and chemistry, and how they contribute to biomaterial development and performance.
- Critically review readings (including text and case studies) and identify areas of potential research

Grading:
Midterm and Final exams: 30% each, or 80% total
HW assignments: 10%
Lab Reports: 30%

A.2.2 Biological Measurements: Imaging and Microscopy Methods (BME 402)

Lecture: 2 sessions, 1 hour each per week

Lab: 1 session, 3 hours per week

Textbooks:
1. The essential physics of medical imaging. by J.T. Bushberg, J.A. Seibert, E.M. Leidholt, Jr., J.M. Boone. ISBN 0-683-30118-7
2. Principles of magnetic resonance imaging, Z. Liang, P.C. Lauterbur. ISBN 0-7803-4723-4.

Course description:
This course presents the foundations of modern medical imaging in a systematic program structured as follows: imaging principles, imaging mathematics, imaging physics, and image generation techniques. Laboratory sessions that are topically synchronized with the course lectures.

Objectives:
The primary goals of the course are to provide biomedical engineering students with exposure to the key topics in mathematics, physics, and computer science that constitute the conceptual core of modern medical imaging. An additional goal of the course is to familiarize the students with the standard clinical and research applications of the several imaging modalities (x-ray, ultrasound, nuclear medicine, CT, and MRI) available in most large hospitals.

Grading:
10% Homework
30% Labs
30% Midterm
30% Final

A.2.3 Introduction to Physiological Systems Analysis (BME 404)

Lecture: 2 sessions, 1 hour each per week

Lab: 1 session, 2 hours each per week

Course description:
This course provides a survey of systems theory with applications and case studies from bioengineering and physiology (e.g., nerve function, muscle dynamics, cardiovascular regulation, physiologic feedback control systems, properties of muscle, cardiovascular function). Analyses within the course includes: differential equations, linear and nonlinear systems, stability, time and frequency domain methods, feedback control, and biological oscillations. Case studies readings and analysis of actual physiologic data will comprise the lab portion of this course.

Prerequisites: MATH 151/155, MATH 152/156, and MATH 254

Textbook: *System Dynamics*, 4th Edition. Katsuhiko Ogata (ISBN-10: 0131424629) Inc.).

Grading:
Homework: 15%
Class Exam 1: 25%
Class Exam 2: 25%
Final Exam: 35%

A.2.4 Biomedical Devices and Design (BME 403)

Lectures: 2, 1 hour sessions per week

Co-requisites: BME 491 (Capstone Design)

Textbook: *Instructor Notes*

Course Description:
This course is a combined academic and industry taught course aimed to educate students on project definition, and the design, development and technology transfer of potential biomedical products. During lectures, case study examples will be provided. Students will learn best practices for bioengineering device development including: product development via design and process control, intellectual property and innovation in biomedical engineering (including patents), and clinical regulatory issues, including clinical trial design. This is a co-requisite for BME 491 (Capstone Design)

Grading:
In-Class Presentation 15%,
Two Exams 25% each
Assignments 25%
Participation 10%

A.2.5 Biomechanics (BME 405)

Lectures: 2 sessions, 1 hour sessions per week

Prerequisites: CVEN 201, MECH 202, BIOL 111/113

Textbook: *Applied Biomechanics: Concepts and Connections*, 1st Edition. McLester/St. Pierre 2008. ISBN10: 0-495-10586-4; ISBN13: 978-0-495-10586-2

Course Description:
Biomechanics is the study of the structure and function of biological systems by means of the methods of mechanics. Biomechanics using traditional engineering sciences (e.g., continuum mechanics, mechanism analysis, structural analysis, kinematics and dynamics) to study biological systems.

Some areas of biomechanics we will explore in this course are:

- Soft body dynamics
- Kinesiology
- Implants, Orthotics, and Prostheses
- Human locomotion and Gait analysis
- Musculoskeletal and orthopedic biomechanics
- Rehabilitation
- Sports biomechanics
- Injury biomechanics
- Human factors engineering and occupational biomechanics

Grading:
In-Class Presentation 15%,
Two Exams 25% each
Assignments 25%
Participation 10%

A.2.6 SimuCase in Speech Pathology (BME 406)

Lectures: 2 sessions, 1 hour sessions per week

Textbook: (None); Lecture presentations and online learning

This course is aimed at exploring clinical speech-language pathology by use of SimuCase (a simulated case study application delivered by SpeechPathology.com). This web-based software is designed to provide numerous cases in multiple settings, allowing the user (the student) to learn and improve clinical decision-making in the area of assessment. The student will practice assessment methods while interacting with virtual clients, family members, and professionals. By asking the right questions, collaborating with appropriate professionals, using proper assessment tools, and interpreting data, the student will make a diagnosis, write recommendations, and send a report.

Simulations are blended with faculty instruction to enable the students to practice, or receive a hands-on approach, to the learned concepts.

Grading:
In-Class Participation 15%,
Two Exams 25% each
Case Study Assignments 35%

New Academic Program Proposal
Five-Year Budget Projection

Institution: _____ Program: _____ Semester of Implementation: _____

DIRECTIONS: Complete the following cost estimates for the first five year budget projections for the proposed new program in Section A. Costs for the second, third, fourth and fifth year are cumulative. If the total budget for the program is not reflected in the "Existing" or "New" categories, please provide further explanation in the space provided below (EXPLANATION). Any "new" costs must be noted by source in Section B.

STUDENT FTE Year 1: _____ Year 2: _____ Year 3: _____ Year 4: _____ Year 5: _____

Section A.	Year 1/Start-up				Year 2				Year 3				Year 4				Year 5			
	Existing[1]	New[2]	Total	FTE	Existing[1]	New[2]	Total	FTE	Existing[1]	New[2]	Total	FTE	Existing[1]	New[2]	Total	FTE	Existing[1]	New[2]	Total	FTE
PERSONNEL																				
Faculty (*salaries/benefits*)[3]	95,140	0	95,140	0.0	77,677	0	77,677	0.0	82,007	7,000	89,007	0.0	84,407	105,737	190,144	0.0	110,160	85,159	195,319	0.0
Graduate Assistants	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0
Support Staff	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0
Fellowships/Scholarships	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0	0	0	0	0.0
Personnel Total	$95,140	$0	$95,140	0.0	$77,677	$0	$77,677	0.0	$82,007	$7,000	$89,007	0.0	$84,407	$105,737	$190,144	0.0	$110,160	$85,159	$195,319	0.0
OTHER RESOURCES																				
Library Materials (*printed*)	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	
Library Materials (*electronic*)	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	
Supplies/Operating Expenses	1,500	0	1,500		1,500	0	1,500		2,000	0	2,000		2,000	0	2,000		2,000	0	2,000	
Equipment	15,000	0	15,000		25,000	0	25,000		34,000	0	34,000		34,000	10,000	44,000		29,000	0	29,000	
Other Expenses	3,500	0	3,500		3,500	0	3,500		4,000	0	4,000		4,000	0	4,000		4,000	0	4,000	
Other Resources Total	$20,000	$0	$20,000		$30,000	$0	$30,000		$40,000	$0	$40,000		$40,000	$10,000	$50,000		$35,000	$0	$35,000	
PHYSICAL FACILITIES																				
Construction	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	
Major Renovation	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	
Other Facility-Related Expenses	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	
Physical Facilities Total	$0	$0	$0		$0	$0	$0		$0	$0	$0		$0	$0	$0		$0	$0	$0	
TOTAL	$115,140	$0	$115,140		$107,677	$0	$107,677		$122,007	$7,000	$129,007		$124,407	$115,737	$240,144		$145,160	$85,159	$230,319	

Section B.	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
EXPLANATION OF "NEW" SOURCES[2]										
State Support	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Federal Grants/Contracts	350,000	100.0%	450,000	100.0%	500,000	100.0%	510,000	100.0%	510,000	100.0%
State Grants/Contracts	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Private Grants/Contracts	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Private Gifts	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other (*please specify*)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL	$350,000	100.0%	$450,000	100.0%	$500,000	100.0%	$510,000	100.0%	$510,000	100.0%

[1]Resources re-allocated from existing programs in Year 1 should be noted in the "Existing" column. In addition, "New" costs from Year 1 that will continue in the second, third, fourth and fifth year should also be noted as "Exisitng."

[2]Any "New" resource utilized to fund a new program must include the source to be provided in the "Explanation of New Sources" section. Total "New" sources for each year must equal the total for each year under "Explanation of New Sources."

[3]Budget estimates for faculty salaries and benefits must include estimated merit and COLA increases in Years 2-5.

EXPLANATION (*Please provide any additional information pertinent to the budget projection, including for example, explain for any new funding sources that are not guaranteed receipt by the institutions how the program will make-up for the potential loss in expected new funding.*):

The proposed BSBME program is housed in the Department of Mechanical Engineering. With a current faculty strength of five fulltime , it is projected that each faculty will generate $70,000 in grant support in the first year increasing to about $100,000 in Year 5. It is assumed that a portion of the direct cost recovery will be applied to the program.
The additional cost in Year 3 is required to support adjunct faculty for a projected enrollment of 20 students. In Year 4, with estimated student enrollment of 40 a new fulltime faculty will be required to support program instruction. The dditional faculty is expected to contribute to the projected grant awards.
Assumptions:
COLA is 3%
Merit Pay is $2,000 per faculty per academic year