PROPOSED DEGREE PROGRAM
STAGE II ABSTRACT FORM

Degree and/or Concentration Proposed: Master of Engineering (M.Eng.) in Electrial Engineering;

Master of Engineering (M.Eng.) in Computer Engineering;

Master of Engineering (M.Eng.) in Photonics

Department/School or College: Department of Electrical and Computer Engineering
College of Engineering

Faculty Contact Person: Assoc. Dean of Research and Graduate Programs
Selim Ünlü 617/353-5067 selim@bu.edu

Anticipated date of matriculation of first students: September, 2011

No. of initial students: 10

Focus of Program:

Preparing students for professional careers in industry pursuing materials engineering and/or engineering management jobs. The program is structured so that students can complete it within one year, and it offers the opportunity for students to be exposed to some engineering management courses in addition to technical depth courses in engineering.

Need for Program:

This program is aimed at a) graduating senior students who want a quick one-year masters in materials before they look for industrial jobs, b) mid-career professionals who want to switch careers and would like to complete a one-year masters degree between jobs, and c) industry professionals who want exposure to Electrical Engineering, Computer Engineering or Photonics and engineering management to further their careers.

Relation to Existing Programs:

The Department of Electrical and Computer Engineering has existing Ph.D./M.S. programs aimed at students who would seek research careers in academia, national laboratories and industry. These degrees require original research leading to a dissertation/thesis or a research project. The M. Eng. Programs proposed in this document do not involve research, do not have a thesis requirement, and accept courses in engineering management towards fulfilling degree requirements, making them suitable for training engineers focused on industrial careers.

Approved at College of Engineering Faculty Meeting: Date: 08/30/09
(by unanimous voice vote with no opposing votes or indicated abstentions)

Signature of Dean: _____ Date: 9/13/10

Stage II Approval: _____ Date: _____
(Office of the Provost)

Approved Stage II Proposal Distribution (Includes deans/directors or relevant units)

:Faculty Council Curriculum & Degrees Committee Date:_____
:University Council Curriculum & Degrees Committee Date:_____
:_____ Date:_____
:_____ Date:_____
:_____ Date:_____

Proposed Degree Programs:
Master of Engineering (MEng) in Electrical Engineering;
Master of Engineering (MEng) in Computer Engineering;
Master of Engineering (MEng) in Photonics

Proposed by:

College of Engineering
Kenneth Lutchen, Dean

and

Department of Electrical and Computer Engineering
David Castañón, Chairman

Executive Summary

This document outlines our proposal for Master of Engineering (MEng) degree programs in Electrical Engineering, Computer Engineering, and Photonics to be offered by the College of Engineering. The MEng programs are distinct from our current Master of Science (MS) degree programs in the following ways: (1) This degree is designed to prepare students for careers in industry, (2) the MEng is focused on developing practitioners and does not include a research-based thesis, and (3) the MEng will reach and serve a new community of students that anticipate enhancing their engineering knowledge at the graduate level in a program than can be completed within 18 months.

The degree program will be managed using the administrative, recruiting, admissions, and advising procedures that now exist both in the Department of Electrical and Computer Engineering, and the College of Engineering Graduate Programs Office. No additional courses are proposed, nor will any additional graduate teaching assistants be requested. The needed instructional and research laboratory facilities already exist, and no new faculty lines will be required at first, hence the incremental cost of the proposal program will be minimal. Conversely, the benefits to recruiting, visibility, and potential for a new cohort of students will be great.

No competing degree programs exist within the University.

1. Program Objectives

1.1 Introduction

The faculty of the Department of Electrical and Computer Engineering (ECE) propose a new program leading to the degree title Master of Engineering in the three areas of Electrical Engineering, Computer Engineering and Photonics. These new degrees, which will

complement our existing, research-oriented Master of Science degrees, will enable us to develop future leaders in industry within the Electrical, Computer, and Photonics disciplines. Demands for professionals capable of applying advanced graduate education in these disciplines continue to be very strong whereas our existing programs focus on developing students to be future researchers. The MEng program fills a gap for educating students that seek out careers and practitioners or who return to graduate study to augment their education for career advancement as practitioners. The demand for graduates in ECE fields remains strong; long-term predictions show substantial labor shortages continuing to the foreseeable future as technology continues to increase in complexity.

1.2 Rationale and Need for the Program

In our program in ECE we have several longstanding invariants characterizing our undergraduate curriculum and product: (1) there is insufficient time to fully impart the full scope of knowledge necessary to prepare a student for a career in engineering, and (2) students generally progress to one of three outcomes: (a) positions in industry as engineers, (b) graduate school in MS or PhD programs, and (c) to other non-engineering fields.

Our current MS and PhD programs, including our BS/MS program, do well to capture undergraduates into the graduate track; however, this same program is primarily focused on developing future **researchers** – individuals that are tracked to our PhD outcomes. The new MEng is intended to satisfy the need to provide additional time for exposure to advanced engineering concepts required to be successful as a practitioner, and to fulfilling the need to support the more applied students in the graduate program leading to careers in industry.

There is a demand from industry both nationally and internationally for professional master's degrees. These MEng programs will allow students to gain exposure to management issues in the global marketplace in addition to a strong training in classical advanced electrical, computer and photonics engineering courses. It will therefore position graduates well to succeed in careers in industry.

1.3 Employment Outlook for Program Graduates

According to the U.S. Bureau of Labor Statistics, "overall engineering employment is expected to grow by 11 percent over the 2008-2018 decade... Competitive pressures and advancing technology will force companies to improve and update product designs and to optimize their manufacturing processes. Employers will rely on engineers to increase productivity and expand output of goods and services".

Employment prospects for ECE graduates are excellent either via growth in the sector or vacancies in existing positions. ECE-related fields represent the largest sector within

engineering including Electrical and Electronics Engineers (301,500), Computer Hardware Engineers (74,700), and Computer Software Engineers (909,600). This last sector, comprising both systems and applications of software engineering is expected to grow by 32 % over the decade.

Additionally, the U.S. Bureau of Labor Statistics states "employment of engineering and natural sciences managers is expected to grow 8 percent over the 2008-2018 decade... Engineers and scientists with advanced technical knowledge and strong communication skills will be in the best position to become managers. Because engineering and natural sciences managers are involved in the financial, production, and marketing activities of their firm, business management skills are also advantageous for those seeking management positions." (www.bls.gov)

With respect to the relatively new Photonics area, the employment prospects track existing EE and Materials Engineering sectors plus application sectors such as Optoelectronics, Displays, Biosensing, Solid State Lighting, and Defense, all of which are expected to grow with this emerging technology. However, it is difficult to exactly quantify the jobs outlook apart from the broad Electrical and Electronics sector described above.

The proposed MEng programs in Electrical Engineering, Computer Engineering, and Photonics will prepare our students well to compete for these engineering management jobs in the coming decade.

Although it is expected that most of the graduates of the MEng program will go to industry, it is possible that this program will also become a feeder for a very small number of students to the Ph.D. program.

1.4 Relationship to Existing Programs at Boston University

The proposed program will leverage courses in several departments at Boston University. In particular, students are encouraged to enroll in courses focused on technology commercialization, entrepreneurship, project management, and other courses that are advantageous to advancement as a practicing engineer. Courses in related disciplines and offered by the college and other colleges (e.g., Computer Science, CAS) are encouraged as a cohesive package available to participating students. In this way we are leveraging existing assets at the University to create a curriculum that fills a needs of students with no apparent adverse impact to existing programs.

Positive impacts of the degree programs include better industrial relations and increased innovation by faculty and students. As the program graduates assume new leadership roles, their successes and propagation by work-of-mouth will further improve the intellectual and entrepreneurial environment of the University.

The creation of the MEng degrees in ECE also aids in fulfilling a goal stated in the College of Engineering Strategic Vision 2010 document of creating a suite of new professional masters programs. Currently, MEng degrees are offered in Biomedical Engineering and in

Systems Engineering. Proposals for new MEng degrees are also being prepared in Manufacturing Engineering and Material Science and Engineering.

1.5 Documentation of Consultation with Cognate Units

The Department of Electrical and Computer Engineering prepared this proposal. The Department of Electrical and Computer Engineering, the College of Engineering Faculty, and the College of Engineering Dean have approved it.

In the preparation of the College of Engineering Strategic Vision 2010, an ad hoc committee which ultimately determined the goal of creating a suite of professional masters programs within the College included members of cognate natural science departments within the College of Arts and Sciences as well as cognate departments within the School of Management.

1.6 Similar Programs at Other Universities

We surveyed the top 50 colleges and university as listed by the US News and World Report to identify MS and MEng degree programs in EE, CE, and Photonics. Of this set of 50, virtually all have MS degree programs in Electrical Engineering (Cornell being the exception with the PhD and the MEng). CE and Photonics degree programs are less distinct and are often associated with EE, ECE, ECS, or Materials Engineering programs as "tracks." By the numbers, they survey of programs that are explicit in these degree programs yields:

MS EE:	49
MS CE:	35
MS Photonics:	4
MEng EE:	16
MEng CE:	20
MEng Photonics:	15

In the 10 Year Plan of the Department of Electrical and Computer Engineering, prepared in the Spring of 2010, seven peer institutions were identified: Duke University, Northwestern University, Rice University, University of Pennsylvania, University of Pittsburgh, Vanderbilt University, and Washington University. Additionally, comparisons are made with other local institutions: Northeastern University, Rensselaer Polytechnic Institute, and Cornell University. We tabulate data on these schools below.

School	MS EE	MEng EE	MS CE	MEng CE	MS PHO	MEng PHO
Boston University	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Cornell	No	Yes	No	Yes	No	Yes
Duke	Yes	No	Yes	Yes	No	No
Northeastern	Yes	No	Yes	No	No	No
Northwestern	Yes	No	No	No	No	No
Rensselaer	Yes	No	Yes	Yes	No	No
Rice	Yes	No	Yes	No	No	No
U Penn	Yes	No	No	No	No	No
U Pittsburgh	Yes	No	Yes	No	No	No
Vanderbilt	Yes	Yes	No	No	No	Yes
Washington U, St. Louis	Yes	No	Yes	Yes	No	No
Totals (Yes)	10	2	7	4	1	2

Among the schools compared, five sport an existing MEng in Electrical or Computer Engineering of Photonics. Cornell's program is focused on ECE courses, culminating in a design project. Vanderbilt also provides a design-based MEng, with a minimum of six semester hours devoted to design, possibly a project. Duke's program features an internship option, instead of a project, together with industry and business oriented courses. Rensselaer provides an all-coursework MEng degree with a two-course breadth sequence. Finally, Washington University in St. Louis provides for a fairly open curriculum of technical courses, including a defended six-unit masters project.

1.7 Enrollment Projections

We plan an initial cohort of 10 students for the fall of 2011 leading to a steady state enrollment of 30 students within two years. These goals are not unreasonable based on a current incoming class of more than 75 MS students in the fall of 2010. Matriculants will be directed from our current LEAP program base, our BS/MS program which will support the BS/MEng, and students from overseas that are offered a new option of the MEng. With the proposed curriculum, we also expect to recruit from the local high technology sector to the MEng which has not been a focus of the department since the mid 1990s.

1.8 Program Administration

Academic program administration will be achieved by the Department of Electrical and Computer Engineering. This department will award the proposed degrees. The College of Engineering Graduate Programs office will administer admissions for the MEng degree programs, including financial aid. MEng students will be provided with program tools including a MEng Program Planning form for selection and tracking of curricular progress.

This process is consistent with existing management of MS and PhD students in the department.

1.9 Academic Standards

Academic standards applied to existing graduate degree programs will be required. The following is excerpted from the current College of Engineering Graduate Bulleting and will be applied to the MEng degree programs:

> Master of Engineering students must maintain a cumulative GPA of 3.00 to remain in good academic standing and to graduate. All graduate courses are counted in the GPA. Only grades of "C" or better fulfill MEng curricular requirements.

1.10 Recruitment

Recruiting of new students will be supported by our current facilities for publicizing our department and college graduate programs including our web sites, printed media, and electronic flyer distribution. Consistent with our existing recruiting efforts, we will publicize the unique features of our program via opportunities for faculty to address students when traveling to program feeder schools, conferences, and promotion via word of mouth. We will also recruit directly from our own undergraduate population, which is expected to be one of our best sources for MEng students. Additionally, we will leverage our College and Department efforts of industrial outreach to communicate the new features of our curriculum.

1.11 Accreditation

The MEng programs in engineering are customarily not subject to accreditation review by the Accreditation Board for Engineering and Technology (ABET).

1.12 Catalog Copy for Proposed Programs

ECE MEng Programs
Master of Engineering Programs
Programs of study leading to the MEng in electrical engineering, computer engineering, or photonics may be pursued. The degree programs have a common structure that includes requirements for concentration, advanced coursework, and elective courses. There is a great deal of flexibility in the program, and each student is expected to work with his or her faculty advisor to design a specific program of study that meets his or her professional needs.

The study program must satisfy both the general graduate requirements of the College of Engineering as well as additional requirements of the Department of Electrical & Computer Engineering. A 3.0 (B) average must be maintained to graduate and grades of C– or lower

are unacceptable for credit. All programs in the department require 32 credit hours of study. Up to 8 credits may be transferred from other approved graduate schools.

Master of Engineering in Electrical Engineering (MEEE), Computer Engineering (MECE), and Photonics (MEP) Master's degree programs in the Department of Electrical & Computer Engineering require a minimum of 32 credit hours of graduate study (500 level and above) in ENG or CAS AS, BI, CH, CN, CS, MA, or PY courses. Students are required to take at least 24 credits of structured coursework (500 or 700 level courses) from EC. All credits towards the MEng degree should be 500 level or higher. All coursework is subject to the following requirements:

Concentration Area
Each student must take at least 16 units (four courses) in one of the ECE concentration areas listed below. Up to 4 units of 900-level EC courses (project, research or directed study) may be used to satisfy the concentration area requirement. The three degree programs are distinguished by the concentration area chosen as indicated below.

ME EE (Electrical Engineering) Concentration Areas

Signal Processing and Communications

ENG EC 505 Stochastic Processes
ENG EC 515 Digital Communication
ENG EC 516 Digital Signal Processing
ENG EC 517 Introduction to Information Theory
ENG EC 520 Digital Image Processing and Communication
ENG EC 563 Fiber Optic Communication Systems
ENG EC 702 Recursive Estimation and Optimal Filtering
ENG EC 715 Wireless Communications
ENG EC 716 Advanced Digital Signal Processing
ENG EC 717 Image Reconstruction and Restoration
ENG EC 719 Statistical Pattern Recognition
ENG EC 720 Digital Video Processing

Systems and Control

ENG EC 501 State Space
ENG EC 505 Stochastic Processes
ENG EC 524 Optimization Theory and Methods
ENG EC 701 Optimal and Robust Control ME 764
ENG EC 702 Recursive Estimation and Optimal Filtering
ENG EC 710 Dynamic Programming and Stochastic Control
ENG EC 724 Advanced Optimization and Methods
ENG SE/ME 740 Vision, Robotics, and Planning
ENG SE/ME755 Communication Networks Control
ENG SE/ME 762 Non-Linear Control of Mechanical Systems

Networking and Communications

ENG EC 505 Stochastic Processes
ENG EC 515 Digital Communication
ENG EC 517 Introduction to Information Theory
ENG EC 541 Computer Communication Networks
ENG EC 544 Networking the Physical World
ENG EC 561 Error-Control Codes
ENG EC 715 Wireless Communications
ENG SE 741 Randomized Network Algorithms
ENG EC xxx Game Theory for Communications (Alanyali)
ENG EC 724 Advanced Optimization and Methods
ENG EC 725 Queuing Systems
ENG EC 727 Advanced Coding
ENG EC 733 Discrete Event Simulation
ENG EC 744 Mobile Computing and Networking
ENG EC 749 Interconnection Networks

Solid-State Circuits, Devices, and Materials

ENG EC 571 VLSI Principles and Applications
ENG EC 574 Solid State Devices
ENG EC 575 Semiconductor Devices
ENG EC 578 Fabrication Technology for Integrated Circuits
ENG EC 579 Microelectronic Device Manufacturing
ENG EC 580 Modern Active Circuit Design
ENG EC 582 RF/Analog IC Design Fundamentals
ENG EC 770 Guided-Wave Optoelectronics
ENG EC 771 Physics of Compound Semiconductor Devices
ENG EC 772 VLSI Graduate Design Project
ENG EC 774 Semiconductor Quantum Structures and Photonic Devices
ENG EC 775 VLSI Devices and Device Models
ENG EC 777 Nano-Optics
ENG EC 782 RF/Analog IC Design

Photonics

ENG EC 560 Introduction to Photonics
ENG EC 563 Fiber Optic Communication Systems
ENG EC 568 Optical Fiber Sensors
ENG EC 569 Introduction to Subsurface Imaging
ENG EC 570 Lasers
ENG EC 574 Semiconductor Materials
ENG EC 575 Semiconductor Devices
ENG EC 577 Electrical Properties of Materials
ENG EC 591 Photonics Laboratory I
ENG EC 760 Advanced Topics in Photonics
ENG EC 762 Quantum Optics
ENG EC 763 Nonlinear and Ultrafast Optics
ENG EC 764 Optical Measurement

ENG EC 765 Biomedical Optics and Biophotonics
ENG EC 770 Guided-Wave Optoelectronics
ENG EC 771 Comp Semi Devices
ENG EC 774 Quantum Structures and Devices
ENG EC 777 Nano-Optics
ENG EK 720 Biophotonic System Design and Prototyping

Radio Science

ENG EC 505 Stochastic Processes
ENG EC 516 Digital Signal Processing
ENG EC 560 Introduction to Photonics
ENG EC 566 The Atmosphere and Space Environment
ENG EC 702 Recursive Estimation and Optimal Filtering
ENG EC 707 Radar Remote Sensing
ENG EC 731 Applied Plasma Physics
ENG EC 716 Advanced Digital Signal Processing
ENG EC 717 Image Reconstruction and Restoration
AS 727 Cosmic Plasmas
AS 783 Ionospheres

Energy Technologies

ENG EC 543 Sustainable Power Systems
ENG EK 546 Assessment of Sustainable Energy Technologies
ENG ME 545 Electrochemistry of Fuel Cells and Batteries
ENG EC 573 Solar Energy Systems
ENG EC 574 Semiconductor Materials
ENG EC 575 Semiconductor Devices

Bioelectrical–must take at least 2 of the EC courses and at least 2 of the BE courses listed below.

ENG EC 505 Stochastic Processes
ENG EC 516 Digital Signal Processing
ENG EC 520 Digital Image Processing and Communication
ENG EC 571 VLSI Principles and Applications
ENG EC 580 Modern Active Circuit Design
ENG EC 582 RF/Analog IC Design Fundamentals
ENG EC 716 Advanced Digital Signal Pressing
ENG EC 717 Image Reconstruction and Restoration
ENG EC 720 Digital Video Processing
ENG EC 740/ Parameter Estimation and System Identification
ENG EC 765 Biomedical Optics and Biophotonics
ENG EC 772 VLSI Graduate Design Project
ENG EC 782 RF/Analog IC Design
ENG BE 511 Biomedical Instrumentation
ENG BE 512 Biomedical Instrument Design
ENG BE 515 Introduction to Medical Imaging

ENG BE 516 Applied Medical Imaging
ENG BE 540 Bioelectric Signals: Analysis and Interpretation
ENG EK 720 Biophotonic System Design and Prototyping
ENG BE 747 Advanced Signals and Systems Analysis for Biomedical Engineering

ME CE (Computer Engineering) Concentration Areas

Embedded Systems and Robotics

ENG EC 504 Advanced Data Structures
ENG EC 511 Software Systems Design
ENG EC 512 Enterprise Client-Server Software Systems Design
ENG EC 535 Introduction to Embedded Systems
ENG EC 544 Networking the Physical World
ENG EC 551 Advanced Digital Design with Verilog and FPGA
ENG EC 712 Advanced Software for Computer Engineers
ENG EC 728 Design and Testing of Distributed Software-Intensive Systems
ENG EC 757 Advanced Microprocessor Design
ENG ME 570 Robot Motion Planning
ENG ME 719 Computational Problem Solving
ENG SE 734 Hybrid Systems
ENG SE 740 Vision, Robotics, and Planning

Chip and Computer Design and Architecture

ENG EC 513 Computer Architecture
ENG EC 551 Advanced Digital Design with Verilog and FPGA
ENG EC 571 VLSI Principles and Applications
ENG EC 580 Modern Active Circuit Design
ENG EC 582 RF/Analog IC Design Fundamentals
ENG EC 713 Parallel Computer Architecture
ENG EC 751 Design of Asynchronous Circuit and Systems
ENG EC 752 Theory of Computer Hardware Testing
ENG EC 772 VLSI Graduate Design Project
ENG EC 782 RF/Analog IC Design
ENG EC 772 VLSI Graduate Design Project [to re-label as 9xx]

Instrumentation and Circuits

ENG EC 535 Introduction to Embedded Systems
ENG EC 571 VLSI Principles and Applications
ENG EC 575 Semiconductor Devices
ENG EC 580 Modern Active Circuit Design
ENG EC 582 RF/Analog IC Design Fundamentals
ENG EC 751 Design of Asynchronous Circuit and Systems
ENG EC 757 Advanced Microprocessor Design
ENG EC 770 Optoelectronics
ENG EC 772 VLSI Graduate Design Project [to re-label as 9xx]

ENG EC 775 VLSI Devices and Models
ENG EC 782 RF/Analog IC Design

Reliable and Secure Computing and Communications

ENG EC 504 Advanced Data Structures
ENG EC 534 Stochastic
ENG EC 535 Introduction to Embedded Systems
ENG EC 541 Computer Communication Networks
ENG EC 561 Error-Control Codes
ENG EC 727 Advanced Coding
ENG EC 730 Information-Theoretic Design of Algorithms
ENG EC 752 Theory of Computer Hardware Testing
ENG EC 753 Fault-Tolerant Computing
ENG EC 761 Information Theory and Coding

Networking and Communications

ENG EC 505 Stochastic Processes
ENG EC 515 Digital Communication
ENG EC 517 Introduction to Information Theory
ENG EC 518
ENG EC 541 Computer Communication Networks
ENG EC 544 Networking the Physical World
ENG EC 561 Error-Control Codes
ENG EC 715 Wireless Communications
ENG SE 741 Randomized Network Algorithms
ENG EC xxx Game Theory for Communications (proposed)
ENG EC 724 Advanced Optimization and Methods
ENG EC 725 Queuing Systems
ENG EC 727 Advanced Coding
ENG EC 733 Discrete Event Simulation
ENG EC 744 Mobile Computing and Networking
ENG EC 749 Interconnection Networks

Software

ENG EC 504 Advanced Data Structures
ENG EC 511 Software Systems Design
ENG EC 512 Enterprise Client-Server Software Systems Design
ENG EC 518 Software Project Management for Software-Intensive Systems
ENG EC 535 Introduction to Embedded Systems
ENG EC 544 Networking the Physical World
ENG EC 712 Advanced Software for Computer Engineers
ENG EC 728 Design and Testing of Distributed Software-Intensive Systems
ENG ME 732 Combinatorial Optimization and Graph Algorithms

High Performance Computing Applications

ENG EC 504 Advanced Data Structures

ENG EC 500 High Performance Programming with Multicore and GPUs
ENG EC 713 Parallel Computer Architecture
ENG ME 702 Computational Fluid Dynamics
ENG ME 719 Computational Problem Solving [to cross list]
ENG ME 732 Combinatorial Optimization and Graph Algorithms [to cross list]
ENG BE 505 Molecular Bioengineering I [to cross list]
ENG BE 562 Computational Biology
ENG BE 561 DNA and Protein Sequence Analysis [to cross list]
ENG BE 703 Numerical Methods and Modeling in Biomedical Engineering
ENG BE 777 Computational Genomics I [to cross list]
CAS MA 539 Methods of Scientific Computing

ME PS (Photonics) Concentration Areas

Photonic Materials and Devices

ENG EC 560 Introduction to Photonics
ENG EC 570 Lasers
ENG EC 574 Semiconductor Materials
ENG EC 575 Semiconductor Devices
ENG EC 577 Electrical Properties of Materials
ENG EC 591 Photonics Laboratory I
ENG EC 760 Advanced Topics in Photonics
ENG EC 764 Optical Measurement
ENG EC 770 Guided-Wave Optoelectronics
ENG EC 771 Comp Semi Devices
ENG EC 774 Quantum Structures and Devices
ENG EC 777 Nano-Optics

Photonic Systems and Applications/Communications

ENG EC 515 Digital Communication
ENG EC 560 Introduction to Photonics
ENG EC 563 Fiber Optic Communication Systems
ENG EC 568 Optical Fiber Sensors
ENG EC 569 Introduction to Subsurface Imaging
ENG EC 570 Lasers
ENG EK 720 Biophotonic System Design and Prototyping
ENG EC 765 Biomedical Optics and Biophotonics
ENG EC 770 Guided-Wave Optoelectronics

Advanced Technical Electives

Students must take 8 credits of EC 700-level coursework.

Graduate Technical Electives

The remainder of the course requirements may be met through graduate technical electives, which include all courses at the 500 level or above in ENG, as well as courses in the following CAS departments: astronomy, biology, chemistry, cognitive and neural

systems, computer science, mathematics, and physics, except courses for nonmajors (e.g., CAS PY 633 Energy). CAS courses require advisor approval and a petition. Certain teaching seminars (e.g., EC 850) and preparatory courses are not allowed. Students are encouraged to explore graduate technical electives that embrace technical project management, entrepreneurship, or leadership development including:

ENG EC 518 Project Management for Software-Intensive Systems
ENG EK 730 Technology Commercialization
ENG ME 502 Intellectual Assets: Creation, Protection, and Commercialization
ENG ME 525 Technology Ventures
GSM SI 851 Entrepreneurship
GSM SI 852 Starting New Ventures
GSM SPI 853 Entrepreneurial Management

Project Credits

Students may take 4 credits of Project (EC 910, EC 911, EC 913, EC 914, EC 915). This may also count as a concentration requirement but may not count as an advanced technical elective. With the exception of EC 915 Computer Engineering Team Project, which is offered as regularly scheduled course, projects are generally arranged by a student or group of students with an individual faculty member. Faculty members may also announce the availability of projects for interested students.

Academic Standards

All graduate courses will be counted in the cumulative GPA, which must be at least 3.0 for good academic standing and graduation. Only grades of C or above receive graduate credit and fulfill MS curricular requirements.

Approval

All individual programs must be reviewed and approved by the academic advisor and the Department of Electrical & Computer Engineering. Approval must be completed before registration for the second semester of study.

Exceptions

Individuals who have outstanding records of professional achievement or academic accomplishment at an advanced level may be exempted, by petition, from some of the MEng program distribution requirements listed above, thereby facilitating the planning of a more advanced program. Such a proposal should be accompanied by a clear statement of objectives and a description of how the program will achieve the proposed objectives. In general, a more advanced course in an area may be substituted for a required course in satisfying the degree requirements.

2. Academic Resources

2.1 Existing Faculty

Murat Alanyali, PhD: communication networks; performance analysis and optimization; stochastic systems.

Hatice Altug, PhD: nanophotonics, photonic crystals.

John Baillieul, PhD: robotics; control of mechanical systems; mathematic system theory.

Enrico Bellotti, PhD: computational electronics; semiconductor materials and device simulations; power electronics; parallel computing.

Irving Bigio, PhD: medical application of optics, lasers, and spectroscopy; biophotonics; nonlinear optics; applied spectroscopy; laser physics.

Richard Brower, PhD: molecular dynamics simulation for biomolecules; lattices methods for QCD and statistical mechanics; quantum field theory of strings and particles.

Robert Brown, PhD: mathematical modeling of the fluid mechanics, heat and mass transfer and interfacial phenomena associated with materials processing, especially melt crystal growth, polymer processing and coating deposition; fluid mechanics of viscoelastic fluids; analysis and numerical simulation of flow instabilities; prediction and characterization of microscopic changes in interface morphology during directional solidification; experimental measurement of microscale morphologies in melt/solid interfaces during solidification; efficient numerical solutions of transport problems, especially by finite element methods; modeling the dynamics of defects in crystalline semiconductors grown from the melt and in semiconductor processing.

David K. Campbell, PhD: general nonlinear phenomena and complex systems; novel electronic materials, including conducting polymers and organic and high Tc superconductors; electron transport in semiconductor superlattices.

Jeffrey B. Carruthers, PhD: photonic wireless communication; mobile and wireless networks; engineering education.

Christos G. Cassandras, PhD: discrete event and hybrid systems, stochastic control and optimization, computer and communication networks, wireless sensor networks, manufacturing systems, supply chain management, computer simulation, command-control systems.

David Castañón, PhD: stochastic control; estimation optimization; image understanding and parallel computation.

Supriya Chakrabarti, PhD: space experimentation; ultraviolet spectroscopy.

Luca Dal Negro, PhD: optical amplification phenomena and laser physics; optical spectroscopy of semiconductor nanostructures; photonic crystals, Anderson light localization and aperiodic dielectrics; nanophotonics and plasmonics.

Solomon Eisenberg, ScD: electrically mediated phenomena in tissues and biopolymers.

Farouk El-Baz, PhD: remote sensing with an emphasis on arid lands, particularly in the location of groundwater resources.

Theodore Fritz, PhD: space plasma and magnetospheric physics; magneto sphere-ionsphere coupling; substorms; charged particles and compositions; rocket and satellite experiments.

Roscoe Giles, PhD: advanced computer architectures; distributed and parallel computing; computational science.

Bennett Goldberg, PhD: room- and low-temperature, near-field microscopy of semiconductors and biological systems; magneto-optics and magnet-transport of two- and one-dimensional electron fields.

Martin Herbordt, PhD: computer architecture; high-performance computing systems and applications, configurable computing, high-level design automation, bioinformatics and computational biology.

Mark Horenstein, PhD: applied electromagnetics; electrostatics; microelectromechanical systems (MEMS).

Allyn Hubbard, PhD: VLSI design using analog and digital techniques in CMOS; neural net chips, smart sensor chips, and chips with biological applications; models of the peripheral auditory system.

Prakash Ishwar, PhD: distributed signal processing; information theory; statistical signal processing and modeling; image and video coding; decision theory; multiresolution signal analysis, and optimization theory with applications to sensor networks; multimedia-over-wireless; information security.

W. Clement Karl, PhD: multidimensional and multiscale signal and image processing and estimation, particularly applied to geometrically and medically oriented problems.

Mark Karpovsky, PhD: design of secure cryptographic devices and smart cards; routing in interconnection networks design and protection of cryptographic devices; fault-tolerant computing; error correcting codes; testing and diagnosis of computer hardware.

William Klein, PhD: theoretical condensed-matter physics; polymer physics, and statistical mechanics.

Ronald W. Knepper, PhD: VLSI integrated circuit technology; SiGe BICMOS device and circuit modeling; silicon CMOS and bipolar devices; numerical device simulation; RF/analog IC design.

Janusz Konrad, PhD: multimedia communications; image and video processing; stereoscopic and 3-D imaging; digital signal processing.

Robert Kotiuga, PhD: electromagnetics; numerical methods for three-dimensional vector field problems; Whitney forms and the Finite Element Method; micromagnetics; nanoscale magnetics; geometric inverse problems; topological aspects of magnetic scalar potentials; Helicity Functionals; analysis of high-performance interconnects.

Min-Chang Lee, PhD: radio communications; experimental plasma physics; ionospheric plasma physics.

Lev Levitin, PhD: information theory; physics of communication and computing; complex and organized systems; quantum theory of measurement; reliable communication and computing; and bioinformatics.

Thomas Little, PhD: Mobile Ad Hoc Networks (MANETs); multimedia computing; computer networking; software engineering; embedded sensor networks.

Fei Luo, PhD: optical fiber devices; optical fiber sensors and systems; fiber laser and amplifier.

Michael Mendillo, PhD: signal processing in space physics; GPS satellite communications; space plasmas in the solar system; low-light level optical instrumentation; planetary atmospheres.

Jerome Mertz, PhD: development and applications of novel optical microscopy techniques for biological imaging.

Theodore Morse, PhD: photonic material processing; optical fiber fabrication, lasers, and sensors; high-power double clad fiber lasers.

Theodore Moustakas, PhD: growth by MBE, MOCVD, HVPE and gas-cluster ion beam deposition (GCIB); growth, fabrication and characterization of optical devices (UV-LEDs, UV-LDs, optical modulators, detectors), electronic devices (high-power diodes, transistors and thyristors) and electromechanical devices (SiC/III-Nitride MEMS sensors); III-nitride semiconductors (materials growth and device fabrication).

Syed Hamid Nawab, PhD: computational signal processing; applied artificial intelligence; analysis algorithms for EMG signals; analysis algorithms for patient activity signals; analysis algorithms for auditory signals.

William Oliver, PhD: global change in the upper atmosphere; radar studies of the upper atmosphere and ionosphere; modeling and simulation.

Roberto Paiella, PhD: device physics and applications of semiconductor quantum structures, optoelectronic devices based on group-III nitride semiconductors, terahertz photonics; plasmonics and related optoelectronic device applications, novel device concepts and circuit architectures for ultrafast all-optical information processing.

Ioannis Paschalidis, PhD: systems and control, networking, applied probability, optimization, operations research, and computational biology. Specific applications of interest include: communication and sensor networks, protein docking, and supply chains.

Venkatesh Saligrama, PhD: information and control theory; statistical signal processing; sensor networks, video analytics over camera webs.
Eric Schwartz, PhD: computational neural science; machine vision; neural anatomy; neural modeling.

Joshua Semeter, PhD: ionospheric and space plasma physics; spectroscopy of atmospheric airglow and the aurora borealis; image processing; radar systems and radar signal processing.

Alexander Sergienko, PhD: correlation spectroscopy, field optical microscopy and spectroscopy of semiconductor materials and devices; quantum communications; remote laser sensing; laser physics; nonlinear optics; quantum optics, including quantum radiometry and metrology.

William J. Skocpol, PhD: formerly nanofabrication; device processing; transport experiments in materials. Primary appointment in the Physics Department, now teaching introductory physics courses and doing administrative work as Faculty Director of the Physics Department.

David Starobinski, PhD: wireless and sensor networks; QOS and traffic engineering; networks performance evaluation.

Anna Swan, PhD: optical studies using Raman spectroscopy, Rayleigh scattering and time-resolved pump-probe experiments to study electronic and vibrational properties and energy dissipation mechanisms and exciton dynamics of low-dimensional systems-graphene and carbon nanotubes. Studies performed on single, individual nanotubes and quantum dots. Another area of interest is spectral self-interference spectroscopy for high-resolution imaging and biosensing.

Malvin C. Teich, PhD: quantum optics and imaging; photonics; fractal stochastic processes; information transmission in biological sensory systems.

Ari Trachtenberg, PhD: error-correcting codes; security; data synchronization (especially for PDAs and mobile networks); sensor-based location detection; algorithms.

M. Selim Ünlü, PhD: near-field optical microscopy and spectroscopy of semiconductor materials and devices; design, processing, characterization, and simulation of semiconductor optoelectronic devices; nanoscale imaging of biological samples, biosensors.

2.2 New faculty and Staff Requirements

It is expected that at least one, and possibly two, new faculty lines will eventually be necessary to handle the increased teaching load specifically in areas of high student demand.

2.3 Existing and Needed library and Computer Resources

None

2.4 Financial and Physical Resources

None

2.5 Special Equipment or Supply Needs

None

2.6 Financial Assistance

Financial assistance to students in the MEng program will be consistent with the MS degree program, when available, with priority to the MS students.

PRELIMINARY BUDGET FORM

Part I-General

1. Name of Program: MEng in Electrical Engineering
2. Proposed by:
   Name: David Castanon Date: 9/13/10
   Unit/Department: 024/203
3. Expected Start Date: 9/1/11

4: Enrollment Headcounts:	Year 1	Year 2	Year 3
a. No. of Full-Time Entering Students:	5	7	10
--MA Students			
--PhD Students			
b. No. of Full-Time Continuing Students			
b. No. of Part-Time Students			
c. TOTAL	5 0	7 0	10 0

5. Faculty Headcounts:			
a. No. of Full-Time Faculty*			
b. No of Part-Time Faculty			
c. TOTAL	0	0	0

6. Staff Headcounts:			
a. 903-No. of Full-Time Administrators*			
b. 904-No. of Part-Time Administrators			
c. 905-No. of Full-Time Support Staff*			
d. 906-No. of Part-Time Support Staff			
e. 908-No. of Student Staff			
f. TOTAL	0	0	0

7. No. of Courses (Credit Hours) Taught:			
a. On-Campus/MA Program	8(32)	8(32)	8(32)
b. On-Campus/PhD Program			

8. If the program requires student housing, identify the number of required bed spaces.	NA	NA	NA

9. Describe any special (program-specific) fees and/or non-standard tuition income that will be generated by the program. NA

10. Describe the extent to which the program will involve students who are enrolled in other programs at Boston University. NA

*Object Codes 900,903,905 to be detailed in Part IV

PRELIMINARY BUDGET FORM (CONT.)

Part II-Income Projections

	Year 1	Year 2	Year 3
1. Tuition Income:			
a. From Full-Time Students	196,570	275,198	393,146
b. From Continuing Student Fees			
c. TOTAL TUITION INCOME	196,570	275,198	393,146
2. Fee Income (When Applicable):			
a. From Full-Time Students			
• Application Fee ($70/Student)	350	490	700
• GSU Fee ($89/Student/Semester)	445	623	890
• Health Fee ($69/Student)	345	483	690
• Program Fee ($ 15 /Student)	75	105	150
• Other Fees (Please Specify)			
b. From Part-Time Students			
• Application Fee ($65/Student)			
• Registration Fee ($40/Student)			
• Other Fees (Please Specify)			
c. TOTAL FEE INCOME	1,245	1,701	3,430
3. Other Income (Please Specify):			
TOTAL OTHER INCOME			
TOTAL INCOME	196,570	276,899	396,570

Note: Fee rates are subject to change. Please be sure to use current fee rates for your calculations.

PRELIMINARY BUDGET FORM (CONT.)

Part III-Expense Projections

1. Salary Expenses:	Year 1	Year 2	Year 3
900 Full-Time Faculty Salaries*			
901 Part-Time Faculty Salaries			
902 Student Teaching Salaries			
903 Administrative Salaries*			
904 Administrative Suppl. Salaries			
905 Support Staff Salaries*			
906 Support Staff Suppl. Salaries			
908 Student Salaries			
TOTAL SALARY EXPENSES	-	-	-
2. Operating Expenses:			
910 Supplies			
911 Telecommunications Equipment			
912 Telecommunications Usage			
913 Equipment-Rental			
914 Postage and Mail Service			
915 Contracted Services			
916 Reproduction and Printing			
917 Books, periodicals, etc.			
918 Travel-Domestic			
919 Meeting Expenses			
920 Dues and Membership			
927 Honoraria			
929 Unclassified			
930 Moveable Capital Equipment			
931 Buildings & Grounds Services			
932 Computer Software and Databases			
934 Travel-Foreign			
953 Minor Equipment			
TOTAL OPERATING EXPENSES	-	-	-
4. Unit 16 Financial Aid :			
939 Tuition aid for two students			
TOTAL EXPENSE	-	-	-

5. Operating expenses already budgeted separately:

Name of Unit/Dept Providing support and description of expenses to be covered.

024/203 already covers all costs associated with program

* Complete Part IV for the 900,903, and 905 salary expenses. Amounts should be identical.

PRELIMINARY BUDGET FORM (CONT.)

Part IV-Position and Salary Detail

I New Lines/Positions
900 Full-Time Faculty

	Name (or "open")		Rank	Unit/Dept	Salary Amounts Charged to Program Year 1	Year 2	Year 3
1							
2							
3							
4							

903 Full-Time Administrative Staff

	Name (or "open"), Title	Unit/Dept	Salary Amounts Charged to Program Year 1	Year 2	Year 3
1					
2					

905 Full-Time Support Staff

	Name (or "open"), Title	Unit/Dept	Salary Amounts Charged to Program Year 1	Year 2	Year 3
1					
2					
3					
Total New Lines/Positions:			-	-	-

II Existing Lines/Positions already budgeted separately (description only)
900 Full-Time Faculty

	Name (or "open")	Rank	Unit/Dept
1			
2			
3			
4			

903 Full-Time Administrative Staff

	Name (or "open"), Title	Unit/Dept
1		
2		
3		
4		

905 Full-Time Support Staff

	Name (or "open"), Title	Unit/Dept
1		
2		
3		
4		

PRELIMINARY BUDGET FORM

Part I-General

1. Name of Program: MEng in Computer Engineering
2. Proposed by:
   Name: David Castanon Date: 9/13/10
   Unit/Department: ECE/203
3. Expected Start Date: 9/1/11

4: Enrollment Headcounts:	Year 1	Year 2	Year 3
a No. of Full-Time Entering Students:	5	7	10
--MA Students			
--PhD Students			
b. No. of Full-Time Continuing Students			
b. No. of Part-Time Students			
c. TOTAL	5 Ø	7 Ø	10 Ø

5. Faculty Headcounts:			
a. No. of Full-Time Faculty*			
b. No of Part-Time Faculty			
c. TOTAL	0	0	0

6. Staff Headcounts:			
a. 903-No. of Full-Time Administrators*			
b. 904-No. of Part-Time Administrators			
c. 905-No. of Full-Time Support Staff*			
d. 906-No. of Part-Time Support Staff			
e. 908-No. of Student Staff			
f. TOTAL	0	0	0

7. No. of Courses (Credit Hours) Taught:			
a. On-Campus/MA Program	8(32)	8(32)	8(32)
b. On-Campus/PhD Program			

8. If the program requires student housing, identify the number of required bed spaces.	NA	NA	NA

9. Describe any special (program-specific) fees and/or non-standard tuition income that will be generated by the program. NA

10. Describe the extent to which the program will involve students who are enrolled in other programs at Boston University. NA

*Object Codes 900,903,905 to be detailed in Part IV

PRELIMINARY BUDGET FORM (CONT.)

Part II-Income Projections

	Year 1	Year 2	Year 3
1. Tuition Income:			
a. From Full-Time Students	196,570	275,198	393,140
b. From Continuing Student Fees			
c. TOTAL TUITION INCOME	196,570	275,198	393,140
2. Fee Income (When Applicable):			
a. From Full-Time Students			
• Application Fee ($70/Student)	350	490	700
• GSU Fee ($89/Student/Semester)	445	623	890
• Health Fee ($69/Student)	345	483	690
• Program Fee ($15/Student)	75	105	150
• Other Fees (Please Specify)			
b. From Part-Time Students			
• Application Fee ($65/Student)			
• Registration Fee ($40/Student)			
• Other Fees (Please Specify)			
c. TOTAL FEE INCOME	1,215	1,701	2,430
3. Other Income (Please Specify):			
TOTAL OTHER INCOME			
TOTAL INCOME	196,570	276,899	395,570

Note: Fee rates are subject to change. Please be sure to use current fee rates for your calculations.

PRELIMINARY BUDGET FORM (CONT.)

Part III-Expense Projections

	Year 1	Year 2	Year 3
1. Salary Expenses:			
900 Full-Time Faculty Salaries*			
901 Part-Time Faculty Salaries			
902 Student Teaching Salaries			
903 Administrative Salaries*			
904 Administrative Suppl. Salaries			
905 Support Staff Salaries*			
906 Support Staff Suppl. Salaries			
908 Student Salaries			
TOTAL SALARY EXPENSES	-	-	-
2. Operating Expenses:			
910 Supplies			
911 Telecommunications Equipment			
912 Telecommunications Usage			
913 Equipment-Rental			
914 Postage and Mail Service			
915 Contracted Services			
916 Reproduction and Printing			
917 Books, periodicals, etc.			
918 Travel-Domestic			
919 Meeting Expenses			
920 Dues and Membership			
927 Honoraria			
929 Unclassified			
930 Moveable Capital Equipment			
931 Buildings & Grounds Services			
932 Computer Software and Databases			
934 Travel-Foreign			
953 Minor Equipment			
TOTAL OPERATING EXPENSES	-	-	-
4. Unit 16 Financial Aid :			
939 Tuition aid for two students			
TOTAL EXPENSE	-	-	-

5. Operating expenses already budgeted separately:

Name of Unit/Dept Providing support and description of expenses to be covered.

0234/203 already covers all costs associated with program

* Complete Part IV for the 900,903, and 905 salary expenses. Amounts should be identical.

PRELIMINARY BUDGET FORM (CONT.)

Part IV-Position and Salary Detail

I New Lines/Positions
900 Full-Time Faculty

	Name (or "open")		Rank	Unit/Dept	Salary Amounts Charged to Program Year 1	Year 2	Year 3
1							
2							
3							
4							

903 Full-Time Administrative Staff

	Name (or "open"), Title	Unit/Dept	Salary Amounts Charged to Program Year 1	Year 2	Year 3
1					
2					

905 Full-Time Support Staff

	Name (or "open"), Title	Unit/Dept	Salary Amounts Charged to Program Year 1	Year 2	Year 3
1					
2					
3					
Total New Lines/Positions:			-	-	-

II Existing Lines/Positions already budgeted separately (description only)
900 Full-Time Faculty

	Name (or "open")	Rank	Unit/Dept
1			
2			
3			
4			

903 Full-Time Administrative Staff

	Name (or "open"), Title	Unit/Dept
1		
2		
3		
4		

905 Full-Time Support Staff

	Name (or "open"), Title	Unit/Dept
1		
2		
3		
4		

PRELIMINARY BUDGET FORM

Part I-General

1. Name of Program: MEng in Photonics
2. Proposed by:
   Name: David Castanon Date: 9/13/10
   Unit/Department: 024/203
3. Expected Start Date: 9/1/11

4: Enrollment Headcounts:	Year 1	Year 2	Year 3
a No. of Full-Time Entering Students:	3	5	8
--MA Students			
--PhD Students			
b. No. of Full-Time Continuing Students			
b. No. of Part-Time Students			
c. TOTAL	30	50	80

5. Faculty Headcounts:			
a. No. of Full-Time Faculty*			
b. No of Part-Time Faculty			
c. TOTAL	0	0	0

6. Staff Headcounts:			
a. 903-No. of Full-Time Administrators*			
b. 904-No. of Part-Time Administrators			
c. 905-No. of Full-Time Support Staff*			
d. 906-No. of Part-Time Support Staff			
e. 908-No. of Student Staff			
f. TOTAL	0	0	0

7. No. of Courses (Credit Hours) Taught:			
a. On-Campus/MA Program	8(32)	8(32)	8(32)
b. On-Campus/PhD Program			

8. If the program requires student housing, identify the number of required bed spaces.			
	NA	NA	NA

9. Describe any special (program-specific) fees and/or non-standard tuition income that will be generated by the program. NA

10. Describe the extent to which the program will involve students who are enrolled in other programs at Boston University. NA

*Object Codes 900,903,905 to be detailed in Part IV

PRELIMINARY BUDGET FORM (CONT.)

Part II-Income Projections

	Year 1	Year 2	Year 3
1. Tuition Income:			
a. From Full-Time Students	117,942	196,570	314,512
b. From Continuing Student Fees			
c. TOTAL TUITION INCOME	117,942	196,570	314,512
2. Fee Income (When Applicable):			
a. From Full-Time Students			
• Application Fee ($70/Student)	210	350	560
• GSU Fee ($89/Student/Semester)	267	445	712
• Health Fee ($69/Student)	207	345	552
• Program Fee ($ 15 /Student)	45	75	120
• Other Fees (Please Specify)			
b. From Part-Time Students			
• Application Fee ($65/Student)			
• Registration Fee ($40/Student)			
• Other Fees (Please Specify)			
c. TOTAL FEE INCOME	729	1,215	1,944
3. Other Income (Please Specify):			
TOTAL OTHER INCOME			
TOTAL INCOME	118,671	197,785	316,456

Note: Fee rates are subject to change. Please be sure to use current fee rates for your calculations.

PRELIMINARY BUDGET FORM (CONT.)

Part III-Expense Projections

	Year 1	Year 2	Year 3
1. Salary Expenses:			
900 Full-Time Faculty Salaries*			
901 Part-Time Faculty Salaries			
902 Student Teaching Salaries			
903 Administrative Salaries*			
904 Administrative Suppl. Salaries			
905 Support Staff Salaries*			
906 Support Staff Suppl. Salaries			
908 Student Salaries			
TOTAL SALARY EXPENSES	-	-	-
2. Operating Expenses:			
910 Supplies			
911 Telecommunications Equipment			
912 Telecommunications Usage			
913 Equipment-Rental			
914 Postage and Mail Service			
915 Contracted Services			
916 Reproduction and Printing			
917 Books, periodicals, etc.			
918 Travel-Domestic			
919 Meeting Expenses			
920 Dues and Membership			
927 Honoraria			
929 Unclassified			
930 Moveable Capital Equipment			
931 Buildings & Grounds Services			
932 Computer Software and Databases			
934 Travel-Foreign			
953 Minor Equipment			
TOTAL OPERATING EXPENSES	-	-	-
4. Unit 16 Financial Aid :			
939 Tuition aid for two students			
TOTAL EXPENSE	-	-	-

5. Operating expenses already budgeted separately:

Name of Unit/Dept Providing support and description of expenses to be covered.

024/203 already covers all costs associated with program.

* Complete Part IV for the 900,903, and 905 salary expenses. Amounts should be identical.

PRELIMINARY BUDGET FORM (CONT.)

Part IV-Position and Salary Detail

I New Lines/Positions
900 Full-Time Faculty

	Name (or "open")		Rank	Unit/Dept	Salary Amounts Charged to Program Year 1	Year 2	Year 3
1							
2							
3							
4							

903 Full-Time Administrative Staff

	Name (or "open"), Title	Unit/Dept	Salary Amounts Charged to Program Year 1	Year 2	Year 3
1					
2					

905 Full-Time Support Staff

	Name (or "open"), Title	Unit/Dept	Salary Amounts Charged to Program Year 1	Year 2	Year 3
1					
2					
3					
Total New Lines/Positions:			-	-	-

II Existing Lines/Positions already budgeted separately (description only)
900 Full-Time Faculty

	Name (or "open")	Rank	Unit/Dept
1			
2			
3			
4			

903 Full-Time Administrative Staff

	Name (or "open"), Title	Unit/Dept
1		
2		
3		
4		

905 Full-Time Support Staff

	Name (or "open"), Title	Unit/Dept
1		
2		
3		
4		