

New Graduate Degree – Certificate Program Proposal Form

Academic Unit: ECE Department

Date: February 6, 2006

Program Name: Master of Biomedical Imaging and Signals (Professional Master's Degree)

Program Director(s): Dr. Jafar Saniie

(Persons named as the Program Director are eligible to receive the New Program Development Incentive from the Graduate College. If someone other than the Program Director should be considered for this incentive, please attach a memo to this effect.)

APPROVAL SIGNATURES REQUIRED:

(1) Academic Unit Curriculum Committee Chair: _____

(2) Academic Unit Head: _____

(3) Graduate Dean: _____

(4) Graduate Studies Committee Chair: _____

(5) Main Campus Faculty Council Chair: _____

Attach additional pages on which a detailed discussion regarding the following items is provided.

1) Program Overview: Describe the objective of the new program.

2) Program Justification:

- a) Provide a detailed discussion on why the program is needed.
- b) Provide a detailed description of the relationship of the proposed program to other degree programs offered by IIT and by the academic unit.
- c) Provide an estimate of the expected number of students.

3) Program Resources:

- a) Describe the personnel requirements necessary to offer the program. Include faculty, teaching Assistant, and support staff. For faculty, indicate current faculty to be associated with the program, detail any requirements for additional faculty hires, and note the number of part-time faculty needed to support the program. Describe how and when resources will be made available to hire any additional personnel that are required.
- b) Describe the facilities necessary to offer the program. Describe how and when resources will be made available to obtain any additional facilities that are required.

4) Program Description:

- a) Provide the detailed degree requirements for the program.
- b) Indicate the admission criteria for the program.
- c) Provide a timeline and schedule for offering the program.

1) Program Overview:

The purpose of this degree program is to prepare students for leading edge positions in industry in the areas of biomedical imaging and signal processing. The Professional Master of Biomedical Imaging and Signals is a course-only degree program that prepares students for professional practice.

2) Program Justification:

The interdisciplinary nature of bioengineering generally involves many facets of electrical and computer engineering. The Department of Electrical and Computer Engineering offers several courses and research opportunities that engage students interested in biomedical engineering. In addition, there are a significant number of courses offered by the Biomedical Engineering Department and other disciplines at IIT which are of great importance to students interested in the professional master's degree in biomedical engineering with specialization in medical imaging and bio-signals.

ECE Department has long maintained high quality education and research programs in signal and image processing and biomedical applications. The proposed new professional master's degree will complement our existing offerings in these fields. It will also address the pertinent national and international needs for developing hardware and software technologies for biomedical imaging and signal processing applications.

The Electrical and Computer Engineering Department has received numerous inquiries from our current and prospective graduate students for pursuing professional master's degree in Biomedical Imaging and signals. It is expected to have more than 20 students enrolled in this program annually.

3) Program Resources:

The proposed degree program will not require any additional resources in the ECE Department and could enhance enrollment in certain ECE courses. Therefore, the ECE faculty have approved these professional master's degrees.

ECE faculty members who are associated with this program are: Professors Miles Wernick, Geoffrey Williamson, Jafar Saniie, Henry Stark, and Yongyi Yang. In addition, ECE Research Assistant Professor Jovan Brankov is associated with this program.

4) Program Description:

Students can pursue a professional master's degree in the area of Biomedical Imaging and Signals by completing the required core and elective courses.

Total required credit hours: 30

Required Core Courses

ECE 511 Analysis of Random Signals
ECE 565 Computer Vision and Image Processing and/or ECE 481 Image Processing
ECE 569 Digital Signal Processing II and /or ECE 437 Digital Signal Processing I
BME 450 (or BIOL 430) Physiology

ECE Elective Courses: minimum of 2 courses

ECE 508 Data Compression
ECE 505 Applied Optimization For Engineers
ECE 566 Statistical Pattern Recognition
ECE 567 Statistical Signal Processing
ECE 568 Digital Speech Processing
ECE 597 Special Project in Biomedical Imaging and Signals

BME Elective Courses: minimum of 1 course

BME 430 Concepts of Medical Imaging
BME 500 Introduction to Biomedical Engineering
BME 501 Biomedical Instrumentation
BME 532 Medical Imaging Science
BME 535 Magnetic Resonance Imaging
BME 538 Neuroimaging
BME 551 Physiological Signal Analysis & Control Theory I
BME 552 Physiological Signal Analysis & Control Theory II
BME 597 Wave Physics and Applied Optics for Imaging Scientist

Note: with advisor's approval, students may take up to two senior or graduate level courses in biology, chemistry, mathematics, physics, chemical engineering, or mechanical engineering on subjects related to biomedical engineering.

The admission requirements for the proposed degree will follow the existing admission requirements for such professional master's degrees in ECE Department.

Students whose accredited B.S. degree is not in electrical and computer engineering may pursue the professional master's degree provided that they have an adequate background and can demonstrate proficiency in the material contained in undergraduate courses equivalent to IIT's ECE 211 and ECE 213 (Circuit Analysis I and II), ECE 218 (Digital Systems), ECE 307 (Electrodynamics), ECE 308 (Signals and Systems), ECE 311 (Engineering Electronics), BIOL 107 (General Biology Lectures), MATH 251 (Multivariate and Vector Calculus), and MATH 252 (Introduction to Differential Equations). A student may demonstrate proficiency by successfully completing the courses or by demonstrating satisfactory performance in one or more special examinations administered by the department.

This program will be beginning Fall 2006.