

Professional Science Master Program (Laszlo Marton)

I. Mission Statement

The Professional Science Master (P.S.M.) program is a master's-level program designed to provide students with the skills needed for success in the development, application, and/or marketing of science and technology in a business setting. As an alternative to the traditional research-based M.S. or Ph.D. programs, the successful completion of the PSM program will provide students who are interested in careers in science- /technology-based businesses and government (regulatory) agencies, and students with interest in further education in the area of environmental law and intellectual property management with basic theoretical, technical and organizational capabilities in the desired area..

The students had been selected (until 2005 F) from one of four areas of emphasis: **biotechnology** (offered by the Department of Biological Sciences), **bioinformatics** (offered by the Department of Biological Sciences in cooperation with the Department of Statistics and the Department of Computer Science and Engineering in the College of Engineering and Information Technology), **environmental geosciences** (offered by the Department of Geological Sciences), and **modeling** for corporate applications (offered by the Department of Physics and Astronomy). Starting in Spring Semester, 2006, the program has been accepting applicants for general **biotechnology** and **bioinformatics** and the program is coordinated by the Department of Biological sciences. An **Admission Committee** and **an Internship Committee** within each of these areas were appointed.

II. Program goals:

The ultimate goal of the P.S.M. is to provide the student with the required background for successful placement of the graduate into a rewarding career in an evolving, high-tech job market. It is for this reason that this degree involves case studies and problem-solving, group projects, and internships with industry. Students also benefit from the collaboration of the Moore School of Business, the USC School of Law, and the College of Mass Communications and Information Studies. The professional skills component of the program enhances students' scientific training with the practical skills needed to apply their technical proficiency to problem solving in a business setting.

Objectives:

The PSM degree recipient should acquire:

1. efficient and creative information processing abilities in the area of interest.
2. solid methodical, technical and technological background for the interest area.
3. basic project organization and management skills focusing on professional and real-world cases
4. general oral and written communication as well as basic PR skills
5. skills to be able to organize, manage (including instructing students and employees) and prepare a public presentation about his own internship project

III. Criteria:

1. The applicant for the PSM program must have a bachelor's degree or higher from an accredited college or university, with competence in a science field related to the chosen area of emphasis. The applicant's undergraduate transcript and GPA must reflect the ability to handle advanced science course work (usually a 3.00 or higher in science courses) since the applicant review occurs in the science department that offers the chosen area of emphasis. All applicants must also submit scores from the general GRE. Deficiencies in one area may be compensated for by strengths in another

2. Coursework: All students are expected to master the knowledge in their area(s) of expertise. The PSM in Biotechnology program of the Department of Biological Sciences has three basic tracks: Plant biotechnology, Cellular and developmental biology; and Microbiology. PSM students are expected to complete the coursework in one full track (36 credits) with a B average or better,

Special course work

- Created for the PSM program is detailed below (12 credit)

COSM (CAS)701 - Business and Legal Issues for Science Managers. (3) Survey of skills requisite for careers in domestic or international business: economics, finance, accounting, management, marketing, presentation skills, patent law, regulatory issues, other subjects for managers of science/technology-based businesses.

COSM (CAS)702 -- Scientific and Technological Problems in Business and Industry. (3) Seminar course in problem solving and project management, responding to cases with significant technical components, drawn from business/industry. Students analyze cases to propose solutions to problems, integrating the major activities of a technically oriented business.

COSM (CAS)790 -- Internship in Science and Technology Based Business. (3) Internship in industry, government agency, or national laboratory. Internship experience culminates in oral and written reports on duties and projects. Internship must include a minimum of 150 hours of experience at the internship site.

General course work:

- Understanding theory/critical reading of literature:

All students are expected to be able to read the scientific literature critically. This is accomplished by passing the basic curriculum classes with B average and successfully presenting analyses of recent papers in advance classes and at journal clubs. The basic curriculum with the alternatives which can be chosen for the different tracks (a more detailed curriculum is shown below)

- Research experience and learning methods/techniques: An introductory level of research performance is expected of our students which can be obtained through BIOL 798 class assignments (3 or 6 credit can be obtained if wished) and the requirement of the BIOL 655 Biotechnology class.

- Public Speaking: All students are expected to be able to make presentations in a public forum. This is accomplished through presentations at journal clubs, many of the graduate level classes require oral presentations (e.g. BIOL 764, 655, 671,) and their internship report has also be presented for the PSM Biotechnology Committee..

- Written communication: the students required to submit their internship report (CAS 790, to the PSM committee as well as they have to prepare proposals (BIOL 655, CAS702).

Required for the biotechnology program:(18 credit hours))

1. BIOL 523 Plant Development (3) Or BIOL 543 Comparative Physiology (3)or BIOL530 Histology(3)
2. BIOL 655 Biotechnology (3) for all tracks
3. BIOL 764 Advanced Plant Physiology/tissue culture (3) Or BIOL714 Advanced Cell biology(3) Or BIOL640 Microbial Ecology(3)
4. BIOL 671 Plant Response to the Environment (3) or. 717 Biological Chemistry (3) or BIOL620 Immunobiology (3)
5. BIOS 700 Introduction to Biostatistics/ STAT 509, 515 (3) or other relevant class for all tracks.
6. BIOL 798 Research in Biology (3)

Additional 6 credit hours from the following (any other relevant class can be approved by the director upon justified interest)

BIOL 798 Research in Biology (3) (extra 3 credits can be included)

BIOL610 Hallmarks of Cancer

Biol 620 Immunobiology

BIOL 670 Plant Ecology (3)

BIOL 70x Selected Topics in (3)

BIOL 703 Selected Topics in Ecology (3)

BIOL 704 Selected Topics in Genetics and Developmental Biology (3)

BIOL 711 Structure and Function of Nucleic Acids (3)

BIOL 712 DNA Transactions and Gene Expression (3)

BIOL 717 Biological Chemistry (3)

BIOL 718 Biological Chemistry II (3)

BIOL 80x. Seminar (2)

** any relevant class from BIOL, PH, MS list of graduate level classes can be approved.

Required for the bioinformatics program (18 credit hours):

BIOL 653 Bioinformatics (3)

BIOL 655 Biotechnology (3) OR 656 Exprmntl Biotech (3)

STAT 700 (3) and STAT 701 (3) Applied Statistics I and II or STAT 712 (3) and STAT 713 (3)

Mathematical Statistics I and II

STAT 530 Exploring Multivariate Data (3) or STAT 730 Multivariate Analysis (3)

CSCE 555 Bioinformatics Algorithms (3)

Additional 6 credits from the following (at least three of which are in CSCE):

BIOL 552 Population Genetics (3)

BIOL 652 Evolutionary Biology (3)

BIOL 711 Structure and Function of Nucleic Acids (3)

BIOL 712 DNA Transactions and Gene Expression (3)

BIOL 714 Advanced Cell Biology (3)

BIOL 717 Biological Chemistry (3)

BIOL 718 Biological Chemistry II (3)

BIOL 777/ STAT 777 Statistical Phylogenetics and Molecular Evolution

BIOL 798 Research in Biology (3)

CSCE 520 Database System Design

CSCE 564 Computational Science

CSCE 565 Computer Graphics

CSCE 567 Visualization Tools

CSCE 582 / STAT 582 Bayesian Networks and Decision Graphs

CSCE 721 Physical Database Design

CSCE 763 Digital Image Processing

CSCE 768 Pattern Recognition and Classification

CSCE 784 Neural Information Processing

STAT 750 Response Surface Methodology

STAT 775 Generalized Linear Models

Results of Recent Program Evaluation:

The most recent changes in our PSM program have been in the coursework as a result of faculty and student feedback. The PSM in Biotechnology Program was focused on plant biotechnology. In order to broaden the admission, from Spring 2006 alternative classes supporting specialization

in Molecular, Cellular and Developmental Biology (including animal systems) and microbiology related biotechnology has also been added to the basic curriculum. (See above) Since the PSM program is a full payment program, the increasing number of interested students and the increasing admission is a very sensitive indicator of the success.