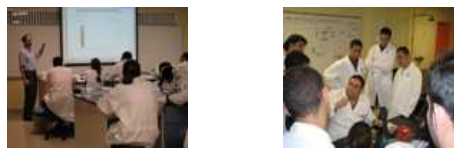


MARC AND SLOAN PROGRAMS



2009 SUMMER WORKSHOPS FOR 1ST & 2ND YEAR BIOLOGY, CHEMISTRY, MICROBIOLOGY AND BIOTECHNOLOGY STUDENTS



*Minority Access to Research
Careers Program (MARC)*

*Sloan Undergraduate Research
Program (SURP)*

June 1-3, 2009

8:00 A.M. - 4:00 P.M.
UPR-Mayagüez Campus

THE MARC AND SURP PROGRAMS

The goal of the MARC (Minority Access to Research Careers) and the SURP (Sloan Undergraduate Research Program) programs at UPR-Mayagüez is to provide students with activities that will improve their potential for academic success. Among the activities of the programs are those that are directed to freshman and sophomore students in the Biology, Microbiology, Chemistry and Biotechnology Departments in order to introduce them to research careers and opportunities in the early stages of their college experience. As part of these activities, five on-campus summer workshops are offered that will provide the opportunity to learn new skills and methodologies relevant to the biomedical sciences. At the same time, the workshops will provide students the opportunity to interact with upperclassmen and faculty who can facilitate the learning process, serve as role models, and generate interest among undergraduates to pursue graduate studies.

Requirements

1. Participants for the workshops must have a minimum GPA of 3.00 (MUST include an official transcript sent to MARC Office, B-265)
2. Provide two science faculty names who can provide a recommendation upon request.
3. A personal statement showing the student's enthusiasm and commitment to science.

**Students who participate in the summer

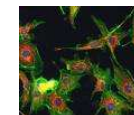
WORKSHOPS TOPICS

1. Genetic Engineering Technology Applied in Molecular Microbiology



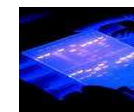
Faculty: Dr. Carlos Ríos-Velázquez
Place: B-256, Biology Building

2. Microscopy Research Workshop



Faculty: Dr Vivian Navas
Place: B-026, Biology Building

3. Isolation and Polyacrylamide Electrophoresis of Lactic Dehydrogenase from Bovine Muscle



Faculty: Dr. Emilio Díaz
Place: Q-340, Chemistry Building

4. Basic Experience in DNA Analysis and Genotyping



Faculty: Dr. Juan C. Martínez
Place: B-227, Biology Building



Faculty: Dr. Patricia Ortiz
Place: Chemical Imaging Center
Department: Chemistry Building



MARC and SURP Programs
UPR-Mayagüez Campus
Biology Building, Office B-265
P.O. Box 9012
Mayagüez, PR 00681-9012



Genetic Engineering Technology Applied in Molecular Microbiology

Since the discoveries of plasmids, endonucleases, and polymerases the way biological questions are asked and research problems solved have changed significantly. Including cloning, the applications of Molecular tools have allowed the advancement of research in all the disciplines of science, especially those with medical, industrial and biotechnological applications.

This introductory workshop will provide basic knowledge and hands on experience in the isolation, manipulation and analysis of DNA. Genomic and plasmid DNA from diverse bacterial isolates, including bioluminescent and anoxyphototroph prokaryotes, will be purified and molecular tools such as Polymerase Chain Reaction (PCR) and restriction analysis (RFLP) will be used for their characterization. The application of this technology in fungi and viruses will also be discussed.

As part of the workshop, the students will: (1) describe and use the basic equipment and materials for the observation of DNA by electrophoresis, (2) design strategies for selection and monitoring of cells expressing genes contained in plasmids, and (3) set up experimental approaches for cloning PCR amplified products.

Microscopy Research Workshop

Microscopes are powerful research instruments that offer different information of the samples. The Scanning Electron Microscope (SEM) is used to study surface morphology at high magnifications. The Confocal laser and the light microscopes allow for internal view of samples. This workshop will provide participants with the basic theory and hands-on training of the SEM, confocal and stereomicroscopes. The students will learn different sample preparation techniques as will observe different samples.

Objectives:

Familiarize the student with:

- The operation of the scanning electron microscope, confocal laser microscope and ancillary equipment including critical point dryer and sputter coater
- Applications of the scanning electron microscope, confocal and light microscopes in science and engineering research
- Microscopy sample preparation techniques
- Differences among different microscopes regarding resolution, magnification, applications and importance.

Isolation and Polyacrylamide Electrophoresis of Lactic Dehydrogenase from Bovine Muscle

Proteins are the most versatile of the biological molecules. Enzymes, hormones, components of connective tissue, antibodies, growth factors, neurotransmitters, transport factors, coordinated movement, and even poisons, are all proteins. Their isolation and characterization are among the most basic and useful skills in the Biochemistry Laboratory.

We will purify lactic dehydrogenase, a very well known and easy to handle enzyme, from bovine muscle. A classic scheme will be used, to better prepare you in the different techniques that can be used. We will then assess the effectiveness of the purification procedure using gel electrophoresis. The schedule will include:

- Day 1** Detection with enzymatic assay, cell homogenization, two-step ammonium sulfate fractionation, centrifugation, dialysis
- Day 2** DEAE-cellulose anion exchange chromatography with a KCl gradient, protein determination with Bradford assay
- Day 3** SDS-polyacrylamide gel electrophoresis of the isolated enzyme.

Basic Experience in DNA Analysis and Genotyping

Introductory workshop to three laboratory techniques commonly used in molecular genetics. All exploit the powerful properties of DNA polymerases to synthesize multiple copies of DNA. The Escherichia Coli DNA polymerase will be used to multiply a recombinant plasmid. The thermoresistant properties of the *Thermus aquaticus* DNA polymerase, combined with the use of specific single-stranded primers, will be employed to amplify a polymorphic fragment from the human mtDNA extracted from mouth mouthwash samples. The DNA products resulting from the first two exercises will be analyzed by restriction digestion and gel electrophoresis. For the first exercise, gel band profiles will show the replicated plasmid to be the same than the original one. For the second exercise, restriction profiles obtained through gel electrophoresis will be related to DNA sequence results obtained through capillary electrophoresis.

MARC AND SURP Summer Workshops

Indicate your priority from 1 to 4.
(Offerings subject to availability)

- Nanotechnology
- Genetic Engineering Technology Applied in Molecular Microbiology
- Microscopy Research Workshop
- Isolation and Polyacrylamide Electrophoresis of Lactic Dehydrogenase from Bovine Muscle
- Basic Experience in DNA Cloning and Forensic

Name _____

Address _____

Phone _____

Email _____

Department: _____

GPA : _____

Student Number: _____ - _____ - _____

- First year student Second year student

Faculty Names: _____

2009 SUMMER WORKSHOPS
FOR 1st & 2nd YEAR
BIOLOGY, MICROBIOLOGY,
CHEMISTRY, AND BIOTECHNOLOGY

**DEADLINE FOR APPLICATION:
APRIL 30 ,2008**

(Submit application to Biology 265 with an official transcript and the personal

Contact persons: Gladys Toro (Coordinator)
Tamar Sanchez (MARC)

UPR-Mayagüez Campus, Biology
Building
MARC Program-Office B-265

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