

poisons
toxicology
investigation
Toxicology
determining
alcohol
legal
crime
forensic
analysis
Read
levels
laboratories
drugs
applications
toxicology



PhD in Environmental Toxicology

College of Sciences and Engineering

Dean: Dr. Patrick Carriere

PhD in Environmental Toxicology (PhD/ENTX)

Department of Environmental Toxicology

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FACULTY

Professors

Gray, Wesley

PhD - Biochemistry
University of Maryland, Baltimore, MD

Uppu, Rao

PhD - Biochemistry
Osmania University/NIN, Hyderabad, India

Batra, Sanjay

PhD - Biochemistry
Kanupur University/CDRI, Lucknow, India

Murthy, Subramanyam

PhD - Biochemistry
Osmania University/NIN, Hyderabad, India

Adjunct Professors

Babu, Bassa

PhD – Biochemistry
University of Delhi/VPCI, New Delhi, India

Biju, Vasudevan

PhD – Chemistry
University of Kerala, Thiruvananthapuram, India

Claville, Michelle

PhD – Organic Chemistry
University of Florida, Gainesville, FL

Hines, James

MD - Meharry Medical College, Nashville, TN JD - Southern University, Baton Rouge, LA

Kousoulas, Konstatin

PhD - Biotechnology
Fairleigh Dickinson University, Teaneck, NJ

Lacy, Fred

PhD - Electrical Engineering
Howard University, Washington, DC

Martinez-Ceballos, Eduardo

PhD - Cell and Molecular Biology
Tulane University, New Orleans, LA

Medicherla, Satyanarayana

PhD - Physiology and Pharmacology
Andhra University/AMC, Waltair, India

Mensah, Patrick

PhD – Engineering Science
Louisiana State University

Onu, Chukwu

PhD - Civil and Environmental Engineering
West Virginia University, Morgantown, WV

Qi, Yadong

PhD - Urban Forestry
Stephen F. Austin State University, Nacogdoches, TX

Raghavamenon, Achuthan

PhD - Biochemistry
Mahatma Gandhi University, Kottayam, India

Samkutty, Pushpa

PhD - Dairy Microbiology
Louisiana State University, Baton Rouge, LA

Stubblefield, Michael

PhD -Engineering Science
Louisiana State University, Baton Rouge, LA

Washington, Samuel

PhD - Analytical Chemistry
Louisiana State University, Baton Rouge, LA

Introduction

The Environmental Toxicology Program offers a Doctor of Philosophy degree in environmental toxicology. There are four study options of which a student could choose one to work towards the degree. This has to be approved by the graduate committee. The study options are

1. Molecular and Reproductive Toxicology and Cell Biology
2. Toxicological Effects of Priority Toxic Chemicals
3. Chemical Detection and Evaluation of Toxicological Substances in the Environment
4. Microbial Treatment and Detection of Hazardous Materials and Environment Contaminants

As of 2017, the PhD Program in Environmental Toxicology has produced over 20 PhD graduates. With this experience, it is possible for making changes in the program including course listings and option areas as described. Students will be notified of all the changes that are made in a timely manner, and will be made available on <http://www.subr.edu/entox>.

Mission Statement

The faculty of the program strive hard to train eligible individuals to conduct basic and applied research on (i) the potential adverse effects of chemicals and complex mixtures of environmental contaminants on biological systems and environment, (ii) to conduct research on the molecular mechanisms of chemically induced toxicity, (iii) to communicate the concepts and findings of toxicological research and evaluations, and (iv) to serve as an information resource on toxicological matters to the state and the general public. The overall goal is to advance the science of environmental toxicology and its relevance to the well-being of human, animal, and plant life.

GRADUATE DEGREES OFFERED

PhD in Environmental Toxicology

ADMISSION REQUIREMENTS

- ✓ An earned BS or MS degree from an accredited university in the areas of toxicology, biology, chemistry, or toxicology-related subject as considered appropriate by the Environmental Toxicology Graduate Committee.
- ✓ A graduate grade point average (GPA) of 3.0/4.0 and an undergraduate GPA of 3.0/4.0 (exceptions will be made where deemed necessary).
- ✓ Undergraduate or graduate course credits of at least three semester hours from an accredited university in each of the following: cell biology, genetics, biochemistry, and organic chemistry. Students who have not completed these prerequisite courses may be admitted to the program on a conditional basis but will not receive full admission until completion of these courses.
- ✓ A Graduate Record Examination score of ≥ 1000 (verbal and quantitative; old scale) or 290 (new scale). Students with exceptional GPAs who do not meet the minimum GRE requirement may be considered on an individual basis.
- ✓ A 600-word essay on the student's career goals and interest in the toxicology program.
- ✓ Three letters of reference with at least two from former instructors.
- ✓ Recommendation by the Graduate Admission Committee of the program.

GRADUATION REQUIREMENTS

For students entering the program with a MS degree, the minimum coursework requirement is 36 hours, typically comprising 21 hours of core courses, 9 hours of toxicology electives, and 6 hours of general electives, exclusive of the thesis, doctoral dissertation and research. Students entering the program with a BS degree are required to complete an additional 18 hours of MS-level foundation courses in biology, chemistry, or toxicology.

Upon completion of the core courses, students must pass the Graduate Comprehensive Exam (GCE) to become a candidate for the PhD degree. After passing the GCE, students may register for dissertation research credit hours.

Students who earn more than two grades of C or below shall be automatically dismissed from the program. In consultation with the advisory committee, each student must develop a plan of study no later

than the beginning of the second year in residence. Based on the committee's recommendation, the minimum requirements may be modified to better prepare the student towards graduation. To remain in good standing, each student must maintain a minimum GPA of 3.0.

POLICY AND GUIDELINES FOR ASSISTANT-SHIP/SCHOLARSHIPS

A limited number of assistantships are available for full-time students with regular admission and who enroll for minimum of 9 credit hours in both Fall and Spring semesters. Further, a student receiving financial assistance is required to work in the laboratory of a designated faculty for a minimum 20 hours/week. Initial award and continuation will be based on academic performance and the recommendation of the Graduate Student Advisory Committee. Where funds become limiting, GPA and research productivity will be used to determine the allocation.

Graduate assistants dropping to less than 9 credit hours in Fall and Spring semesters or less than 6 credit hours in summer shall have their assistantships revoked. Students who fail to qualify and subsequently improve will be required to wait for one semester before applying for reconsideration.

Since the PhD program is a desegregation program mandating diversity, special consideration shall be given to students coming from minorities for the award of assistantships, tuition waivers and tuition scholarships.

General Tuition Waiver/Scholarships

Students who are enrolled full-time but do not have assistantship shall be considered for tuition scholarship subject to

1. Availability of funds
2. Have a full-time load of 9 or more credit hours till the end of the semester.

Any student who is employed full time elsewhere will not be eligible for receiving financial support.

GRADUATE ADVISORY COMMITTEE

Each student with the help of the major advisor and the Chairman should have an advisory committee before the beginning of the second year. The advisory committee should consist of no fewer than four members of the graduate faculty. At least two members, including the Program Leader will be from the Environmental Toxicology Program recommending the degree, and at least one member drawn from a different educational discipline.

COURSE OF STUDY

Core Courses (twenty-two hours are required) ***

ENTX 700	Bioethics.....	3 credits
ENTX 710	Environmental Toxicology Seminar.....	1 credit*
ENTX 721	Principles of Environmental Toxicology I.....	3 credits
ENTX 722	Principles of Environmental Toxicology II.....	3 credits
ENTX 723	Advanced Biochemistry I.....	3 credits
ENTX 725	Biochemical and Molecular Toxicology.....	3 credits
ENTX 731	Animal Physiology.....	3 credits

ENTX 737 Biochemical Method..... 3 credits**

*** must be taken once, may be repeated up to four times**
**** 3 credits are required may be repeated up to 6 credits**
***** B or better is required for all the core courses**

Toxicology Electives (nine hours are required)

ENTX 724 Advanced Biochemistry II 3 credits
 ENTX 732 Aquatic Toxicology 3 credits
 ENTX 733 Cell Physiology 3 credits
 ENTX 736 Special Topics in Toxicology..... 3 credits
 ENTX 740 Environmental Microbiology 3 credits
 CHEM560 Toxic Substances, Effects, and Controls 3 credits
 PPOL 750 Environmental Regulations and Law 3 credits
 ENTX 750 Organ System Toxicology 3 credits
 ENTX 757 Bioinformatics 3 credits

General Electives* (six hours are required)

BIOL 506 Biostatistics: Experimental Design and Analysis (or SMED739 Applied Statistics)..... 3 credits
 ENTX 744 Risk Assessment 3 credits
 ENTX 753 Recent Advances in Virology..... 3 credits
 ENTX 755 Molecular Immunology 3 credits

**These courses could be selected from existing courses in other PhD programs, other master's programs, including Chemistry, Biology, Nursing, Urban Forestry, or Public Policy.*

Research Courses***

ENTX 799 Environmental Toxicology
 Research Practicum 3-6 Credits
 ENTX 800 Dissertation Research 3-9 Credits

****may be repeated for a minimum of fifteen hours each.*

A MINIMUM TOTAL OF THIRTY-SIX HOURS ARE REQUIRED TO COMPLETE THE CURRICULUM

COURSE DESCRIPTIONS

Core Courses

ENTX 700 BIOETHICS (Credit, 3 hours). Topics include the bioethical considerations and concerns that confront the conduct of research and its perceptions by the general public. Special attention is given to the ethics of environmentally related research, journalism, human experimentation, genetic research, professional role responsibility, and conflicts of interests. The course also covers Institutional Review Board policies as well as Institutional Animal Care and Use Committees as mandated by the National Institutes of Health. The course will be taught from a multi-disciplinary approach to provide opportunities for the full participation of students.

ENTX 710 ENVIRONMENTAL TOXICOLOGY SEMINAR

(Credit, 1 hour). This course must be taken once, but may be repeated for a maximum of 4 hours. Requirements include reports by students, resident faculty and distinguished visiting faculty on topics of current interest in Environmental Toxicology.

ENTX 721-722 PRINCIPLES OF ENVIRONMENTAL TOXICOLOGY I & II (Credit, 3 hours each). Introduction to the basic principles of environmental toxicology; applications of these principles in industrial and other job related environments; regulatory perspectives; spills; anthropogenic pollution problems; human risk management; overview of classes of toxic agents, routes of exposure, target tissues (human and other mammalian species); testing and screening agents for genotoxic activities; molecular genetic approaches to environmental biomonitoring.

ENTX 723 ADVANCED BIOCHEMISTRY I (Credit, 3 hours). An advanced biochemistry course concerned with major metabolic pathways and their control. The metabolism of carbohydrates, proteins, lipids, and nucleic acids is discussed. Bioenergetics is also featured and details the production and utilization of energy by the cell. Other topics include metabolic diseases with emphasis on molecular control, response to toxins, and adaptation of cells to pollutants.

ENTX 725 BIOCHEMICAL AND MOLECULAR TOXICOLOGY (Credit, 3 hours). The effects of chemicals on biochemical pathways, target organelles (e.g., mitochondria, lysosomes), and specific enzymes are the central theme of the course. Selected topics include, phase I and II xenobiotic metabolism, generation of reactive intermediates of chemicals, genotoxicology and principles of chemical carcinogenesis.

ENTX 731 ANIMAL PHYSIOLOGY (Credit, 3 hours). A comprehensive and integrated course designed to cover the principles and fundamental concepts associated with the functional activities and mechanisms of action involved with the coordination and maintenance of homeostasis, bioenergetics, biocatalysis and metabolic processes. Clinical and toxicological relationships will also be covered.

ENTX 737 BIOCHEMICAL METHODS (Credit, 3 hours). Must be repeated for a maximum of 4 hours degree credit. This is a laboratory rotation course where students are exposed to current methodology in the environmental and biochemical sciences. This course will involve theoretical and practical applications of quantitative and qualitative measurement in biological systems. Students enrolled in this course will do nine-week rotations in selected research laboratories and give an oral presentation on methods learned during the rotation.

Toxicology Electives

ENTX 724 ADVANCED BIOCHEMISTRY II (Credit, 3 hours). This course features a study of the effects of environmental contaminants on aquatic and marine organisms. The relationships between impact on individual organisms, populations, communities and ecosystems, relative effects of chemicals on larvae and embryo development, biomarkers of pollutant exposure for early-warning detection of deleterious effects of chemicals, bioaccumulation and bioavailability of effluents, sediment and other particulate adsorption models, ecological risk assessment for aquatic toxicants and comparative biochemical mechanisms, including metabolism, adaptation and toxicity.

ENTX 732 AQUATIC TOXICOLOGY (Credit, 3 hours). This course features a study of the effects of environmental contaminants on aquatic and marine organisms. The relationships between impact on individual organisms, populations, communities and ecosystems, relative effects of chemicals on larvae and embryo development, biomarkers of pollutant exposure for early-warning detection of deleterious effects of chemicals, bioaccumulation and bioavailability of effluents, sediment and other particulate adsorption models, ecological risk assessment for aquatic toxicants and comparative biochemical mechanisms, including metabolism, adaptation and toxicity.

ENTX 733 CELL PHYSIOLOGY (Credit, 3 hours). A study of the fundamental cellular functions with emphasis on molecular and biochemical principles, enzyme catalysis, metabolic pathways, the flow of information and energy, and energy transformation and mobilization.

ENTX 736 SPECIAL TOPICS IN TOXICOLOGY (Credit, 1-3 hours). May be repeated for a maximum of 9 hours degree credit. This course will cover current topics pertaining to Environmental Toxicology. Issues relating to method development and application, toxin and analysis, disease prevention, environmental issues and new environmental law are possible topics.

ENTX 740 ENVIRONMENTAL MICROBIOLOGY (Credit, 3 hours). This course will involve an advanced study of the practices of biodegradation and bioremediation with emphasis on microbial ecology. Specific topics include the basic concepts of

ENTX 741 AIR POLLUTANTS AND HEALTH (Credit, 3 hours). The science and technology of air pollution and its control, effects of air pollutants on plant and animal life and on inanimate objects and materials, and methods of detecting and measuring air pollutants and their effects on the environment

ENTX 750 ORGAN SYSTEMS TOXICOLOGY (Credit, 3 hours). The course features topics related to the effects of chemical toxicants and toxins on the various major organ systems of mammalian and other vertebrate models. Topics include systematic study of the toxicity of chemicals on hepatic, neural, endocrine, renal, circulatory, and immune systems. A central theme is the nature of the organ systems and its relationship to organ-specific toxicity of chemicals.

ENTX 757 Bioinformatics (Credit, 3 hours). This is an introductory web-based course that focuses on the assessment of Bioinformatics in Environmental Toxicology. Principles, techniques, and applications in the fields of genetic engineering, sequence alignment, substitution methods, phylogenetics, genomics, and gene recognition, are emphasized. The course also offers hands-on experience with subject related computer programs and algorithms.

General Electives

The listed and additional general electives that are consistent with the student's program of study may be taken with the approval of the

student's advisory committee. General electives are designed to enrich the individual student's graduate degree program.

ENTX 726 ADVANCED BIOSTATISTICS (Credit, 3 hours).

This course is designed to acquaint advanced toxicology students with research designs for biological experimentations. Emphasis is on parametric and nonparametric statistical analysis and their applications to more advanced experiments.

ENTX 744 RISK ASSESSMENT (Credit, 3 hours). This course focuses on the risk of hazardous chemicals to plants and animals. Methods of identification for hazardous chemicals are discussed, as well as the possible adverse health effects associated with these chemicals. The course also focuses on chemical dose-response in humans, chemical exposure assessment in various environmental conditions, and the characterization of risk to a given population.

ENTX 753 RECENT ADVANCES IN VIROLOGY (Credit, 3 hours).

This course offers an advanced analysis of the biology and pathogenic effects of animal viruses. Recent advances and discoveries in the field of virology are discussed. The latest methods of virus detection and treatment are also discussed.

ENTX 755 MOLECULAR IMMUNOLOGY (Credit, 3 hours).

This course focuses on cell-mediated immune responses. Special emphasis is given to the formation of the immune system at the molecular level, as well as the antigen-antibody relationship, the molecular structure of immunoglobulins, autoimmunity, and immune deficiency diseases and treatment.

Research

ENTX 799 TOXICOLOGY RESEARCH PRACTICUM (Credit, 3-6 hours).

This course provides the opportunity for students to conduct basic and applied research under the direction of an Environmental Toxicology faculty member. Students will develop questions related to toxicological research and conduct practical research aimed at answering the question. Emphasis will be placed on the use of "the scientific method", making scientific observations, and recording data. Further, data analysis, interpretation and data presentation in the form of abstracts, scientific papers, and research proposals will be covered. This course is only open to students who have not yet qualified for PhD candidacy.

ENTX 800 DISSERTATION RESEARCH (Credit, 3-9 hours).

Each student is required to conduct research that is aimed at producing a dissertation. The student and supervising faculty will choose a research topic related to toxicological research and conduct the research in a cooperative manner. This course is only open to students who have qualified for PhD candidacy. Each student must perform dissertation research in a timely manner and submit the dissertation