College of Arts and Sciences
Master of Science (MS) in Biology

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* For additional information please refer to the Graduate Handbook.

Degrees Offered: Master of Science (M.S.) in Biology, Regular Thesis
Mission/Purpose of Program: The offering of a graduate degree in biology will provide students who have attained the baccalaureate degree in biology or other natural sciences, the opportunity to broaden and increase their knowledge in the biological sciences. Additionally, it provides students the opportunity to enter into or expand their experience in experimental research in the areas of health disparities, cancer, environmental biology, cardiovascular disease, mycology, parasitology, and microbiology. The degree allows students to gain employment in industry, education, or pursue further study in doctoral programs in health-related fields or biomedical or environmental research.

Admission Requirements:

- To be considered for the Master of Science degree program in Biology, applicants must have completed the B.S degree from a department from an accredited institution in the following areas for the Master's program in:
    - Biology
    - Chemistry
    - Biomedical Engineering
    - Psychology
    - Bio-Physics
    - Computational Biology
- Prerequisite academic work should provide evidence that the application shall be able to pursue the graduate course effectively
- Applicants must also have a cumulative GPA of 3.0 or better and a science GPA of 3.0.
- Applicants must have the following GRE score: verbal at least 150; quantitative at least 150.
- Official Transcripts from all colleges/universities attended (International Students must have transcripts translated through World Education Services -WES)
- Completed Application along with the required amount of application fees
- 3 Letters of Recommendation
- Personal Statement
- Financial Support Statement (International Students –only)—Note: If accepted to the department, then department can submit financial support statement if funds available.
- Test of English as Foreign Language (TOEFL) Scores (International students only).

Graduation Requirements:
Core Courses: 13 credits
Elective Courses: 11 credits
Thesis Research: 6 credits
Qualifying Examination
Admission to Candidacy
Passing of the Final Oral Examination

Advisory/Examination Committee:
During the first semester of his/her study in the Master of Science program, the student and his/her Major Professor must recommend to the Head of the Department for approval, the student's Advisory Committee consisting of a minimum of five members including the Major Professor. Two of the members can be from outside of the department as long their research interests align with that of the student.

Core Courses (12 credits): Required for All Students in the Master's program
IBSC
MSEG 0518: Materials Science and Engineering – 3 Credits
MSEG 0521: Polymer Science and Engineering – 3 credits
Math 0561: Advanced Calculus – 3 credits

Elective Courses (11 credits): Determined by Student's Major Professor
Elective courses may be any graduate level courses offered at Tuskegee University or elsewhere. Approval of the Major Professor and Graduate Coordinator is necessary for a student to enroll in certain electives. Electives can be taken from Agricultural Sciences, Biomedical Sciences, Chemical Engineering, Materials Engineering and Food and Nutritional Sciences.

Transfer Credits
The student's Advisory Committee may recommend transfer credits for up to 9 hours for graduate courses taken by the student at Tuskegee University as part of another graduate program or at any other institution. Transfer credits may be recommended under both core and elective categories.

Admission to Candidacy
Graduate students can apply to be admitted to candidacy for the M.S. degree Immediately after completing 18 credits of course work at Tuskegee University, the student must submit to the Dean of Graduate Studies, a completed application for the Candidacy for the degree.

Seminars
A student pursuing the Master of Science degree in Biology must present at least two seminars. The first seminar shall be the presentation of the student's research proposal of the Master's thesis. The second or the final seminar shall be his/her Final Oral Examination for the degree. The student is also required to participate in all seminars arranged by the department.

Thesis
The final draft of the thesis must be filed with the student's Advisory Committee at least 30 days before the date listed in the university calendar for final copies to be submitted during the semester in which the student expects to graduate. The student must present to the Dean of Graduate Programs a "Preliminary Approval Sheet" (PAS) bearing the signature of the Major Professor before the final oral examination may be scheduled and before copies of the thesis are distributed to members of the Examining Committee. After the "Preliminary Approval Sheet" has been signed, it should be submitted to the Dean of Graduate Studies before the final examination is scheduled and before the final draft of the thesis is prepared for final approval. Approval of the thesis in its final form rests with the Examining Committee.

Research assistantships and fellowships are available for students admitted to the program. Continuation of the financial support depends on student's performance in course work and research, and availability of funds.

List of Core Courses
EVSC 500--Biostatistics

List of Elective Courses

BIOL 0502. ADVANCED MICROBIOLOGY. 1st Semester. Lect. 2, Lab 3, 3 credits. Introduction to microbial biochemistry and physiology, nutrition, growth, composition, metabolism, and regulation in the context of macro-molecular organization of selected bacteria. Prerequisite. BIOL 0301.

BIOL 0503. EXPERIMENTAL BIOLOGY. 1st Semester. Lect. 1, Lab 6, 4 credits. A laboratory course designed to provide an introduction to methods, experimental techniques and instruments used in biomedical research. Biochemical theory will be discussed for justification of "best" experimental procedures.

BIOL 0505. PARASITOLOGY. 2nd Semester. Lect. 3, Lab 3, 4 credits. The fundamental principles governing parasites of man and domestic animals. Emphasis is given to the physiology, morphology, life history, diagnosis, control and host-parasite relationships. Labs will include most recent techniques for collecting and preserving parasitological specimens. Prerequisite: minimum of 12 hours of biology, junior or higher standing or consent of the instructor.

BIOL 0507. PLANT PHYSIOLOGY. On Demand. Lect. 2, Lab 6, 4 credits. Fundamental concepts of functions and metabolism in seed plants, including physical and chemical concepts of osmosis, diffusion, water relations, photosynthesis, respiration, enzymes, growth and development and growth regulators. Prerequisites: 16 hours of Biology, CHEM 0320 and Junior Standing.

BIOL 0509. PHYSIOLOGICAL GENETICS. On Demand. Lect. 3, 3 credits. The basic principles of molecular genetics with detailed study of structure function, control and alteration of the individual gene; to include current techniques used in the study of molecular genetics. Emphasis will be placed on eukaryotic and developing systems. Prerequisite: minimum 16 hours of biology and BIOL 0309 or permission of the instructor.

BIOL 0510. ANIMAL BEHAVIOR. On Demand. Lect. 3, Lab 3, 4 credits. An introduction to animal behavior, with emphasis on the animal's relationship to the environment, the ontogeny of behavior, and the physiological basis of behavior. Prerequisite: Minimum of 15 hours in biology.

BIOL 0511. VERTEBRATE ZOOLOGY. On Demand. Lect. 3, Lab 3, 4 credits. A course designed to acquaint the student with the biology of vertebrate populations in their natural habitats. Prerequisite: 15 hours in biology.

BIOL 0513. GENERAL ENTOMOLOGY. Alternate 1st Semesters. Lect. 3, Lab 3, 4 credits. Biology, recognition, and modern methods of controlling major insect pests of plants and animals. Prerequisite: one year of biology and/or Instructor’s Permission.

BIOL 0515. MEDICAL MYCOLOGY. On Demand. Lect. 3, Lab 3, 4 credits. A study of the fungi which cause superficial, intermediate and systemic mycoses in man and other mammals. The laboratory will consist of an in-depth study of the morphology of common contaminants and of pathogenic species of fungi.

BIOL 0518. IMMUNOLOGY. 2nd Semester. Lect. 3, Lab 3, 4 credits. The basic principles of immunity and hypersentivity, mechanisms of antibody formation, chemical and physical characteristics of antigens and antibodies, auto-immunity phenomena, allergy and transplantation immunity.

BIOL 0519. HUMAN GENETICS. Alternate 2nd Semesters. Lect. 3, 3 credits. A modern presentation of the principles of human genetics which emphasizes classical and molecular approaches to understanding the nature of the gene. Information will be derived from family, pedigree, population and molecular studies. Prerequisites: BIOL 0309, MATH 0107, one year of chemistry or permission of the instructor.

BIOL 0540. FOUNDATIONS OF CANCER BIOLOGY. 2nd Semester. Lect. 3, Lab 0, 3 credits. This course will encompass the fundamentals of cell biology that underlie cancer and cancer progression. In doing so, it will examine selected cutting-edge approaches and findings from the areas of basic cancer research, clinical studies, and community research focusing on prevention and intervention strategies. Prerequisite: Graduate or advanced undergraduate status and two of the following three courses or their equivalents: BIOL 309, BIOL 340, BIOL 360; or permission of instructor.

BIOL 0560. CYTOGENETICS. 1st Semester. Lect. 3, Lab 4, 4 credits. An indepth study of chromosomes; their chemistry, structure, function, aberrations, and behavior. Emphasis will be placed on the human chromosomal complement. Prerequisite: 16 hours of biology to include BIOL 0309.

BIOL 0561. ADVANCED CYTOGENETIC METHODOLOGY. On Demand. Lect. 2, Lab 6, 4 credits. An in depth presentation of the methodologies of chromosome study. Emphasis will be placed on hands on laboratory experience in (a) culture of cell types used in cytogenetic diagnosis; (b) preparation and recognition of banded chromosomes; (c) recognition of the major types of numerical and structural chromosome abnormalities and (d) photomicrographic principles and techniques including visible and fluorescent light techniques, the interactions of light with film and the preparation of prints from negatives. These topics will be considered in the context of modern cytogenetic studies. Prerequisite: BIOL 0309 and an additional 12 hours in biological sciences.

BIOL 0565. BIOTECHNOLOGY. 2nd Semester. Lect. 2, Lab 6, 4 credits. This course is designed to introduce advanced undergraduates and graduate students to basic recombinant DNA techniques including growth and manipulation of phages and their bacterial hosts; isolation, quantitation, and electrophoretic analysis of DNA; restriction and ligation of DNA cloning in lambda, M13 and plasmid vectors; and site-specific mutagenesis. The focus of the course is hands-on experimentation; however, time will be devoted to discussion of the application of these and other techniques to a variety of research problems. By the end of the course, the student should have a working knowledge of basic recombinant technology, should have an introductory knowledge of more specialized techniques and should be familiar with the terminology and resource literature of genetic engineering. Prerequisite: BIOL 0230/0231, 0250/0251, 0301/0303

BIOL 0595. SPECIAL ASSIGNMENTS. 1st and 2nd Semesters. 1-3 credits. Special work, such as directed reading, independent study of research, supervised library, laboratory or fieldwork, or presentation of material not available in the formal courses of the department. Upon approval by the faculty advisor and Department Head, a student may register for 1-3 hours credit. The field in which the work is offered will be indicated in the student's record. Prerequisite: Senior or graduate standing.

BIOL 0596. NEUROSCIENCE. 1st Semester. Lect. 3, Lab 3, 4 credits. Course will consist of instruction through lecture and laboratory sessions. Lectures will include: introduction to the nervous system, cellular neuroscience, synaptic functions, structure and function of biological membranes, ion transport through membranes, physiology of ion channels, mechanism of receptor regulation, functional reconstitution of membranes, phospholipid bilayers, neural plasticity, learning and memory. Laboratory sessions will include dissection of sheep brain, making patch pipettes, bilayer formation on bimolecular lipid membrane chamber and reconstitution of receptor proteins on large and small bilayers, multi and single channel recordings, computer analysis of single channel data. Prerequisite: BIOL 0120/0121, 0230/0231.

BIOL 0604. GENERAL CYTOLOGY. 1st and 2nd Semesters. Lect. 3, Lab 3, 4 credits. Morphology, chemical organization, and function of cytoplasmic and nuclear components of the cell. Cytological and cytochemical techniques. Prerequisite: course in organic chemistry and consent of instructor.

BIOL 0605. EXPERIMENTAL PARASITOLOGY. On Demand. Lect. 2, Lab 3, 3 credits. An advanced study encompassing animal parasites. Included are adaptations to parasitism, host- parasite relationships, immunological aspects and experimental procedures employed in the analysis of parasitism. Prerequisite: BIOL 0505 or its equivalent.

BIOL 0610. MOLECULAR BIOLOGY. On Demand. Lect. 3, 3 credits. A lecture discussion course with emphasis on gene structure, mutation, evolution, genetic load and expression, the biochemical consequences of these on DNA replication, RNA transcription, and protein synthesis. Attention will also be focused on the molecular basis of regulatory mechanisms in living systems.

BIOL 0620. PHYTOHORMONE AND VITAMINS. 1st Semester. Lect. 3, 3 credits. Same as Plant & Soil Science 650. Chemistry, physiology and practical application of phytohormone, vitamins in development of plants. Prerequisite: BIOL 0507 or its equivalent.

BIOL 0630. EXPERIMENTAL EMBRYOLOGY. Offered on Demand. Lect. 2, Lab 4, 4 credits. An analysis of development in the embryo and other morphogenetic systems as revealed by experimentation. Included are topics and experiments in classical experimental embryology, chemical embryology, tissue interaction, hormonal control of development of regeneration. Prerequisite: BIOL 0302, or its equivalent.

BIOL 0640. EXPERIMENTAL CYTOLOGY. Offered on Demand. Lect. 1, Lab 5, 3 credits. Discussions of current problems in some areas of cytological research. Selection of and experimentation with a research problem by individuals in the course form the main direction for discussion. Prerequisite: BIOL 0604 or equivalent and instructor's consent.

BIOL 0650. BIOLOGY SEMINAR. 1st and 2nd Semesters. 1 credit. Required of all graduate students in biology. Review of literature and research in the various areas of biology to be presented orally. Each student will be advised by a member of the graduate faculty in biology. Prerequisite: Graduate standing in biology. BIOL 0651. SAME AS BIOL 0650 BIOLOGY SEMINAR.

BIOL 0652. TOPICS IN MODERN BIOLOGY. 1st and 2nd Semesters. 1 credit. A one-semester course in which the main theme or topic for discussion during any semester will vary from year to year. Prerequisite: Graduate standing.

BIOL 0700. RESEARCH IN BIOLOGY. 1st and 2nd Semesters, Summer on Demand. 1-6 credits. Arranged under supervision of a major advisor in the specific area of research interest. Prerequisite: Graduate standing.

BIOL 0752. CONTINUOUS REGISTRATION. 1st and 2nd Semesters, Summer on Demand. 0 credits. For students writing a thesis and/or studying for examinations.

BIOL 0754. CANDIDATE FOR DEGREE. 0 credit. For students who have finished all requirements and are graduating that semester.

Graduate Faculty in Biology
Chastity Bradford, PhD
Marcia Martinez, PhD
John Davidson, PhD
Roberta Troy, PhD
Honghe Wang, PhD
Richard Whittington, PhD
Clayton Yates, PhD

Additional details that are not shown in this handout may be found in the Bulletin of the Department of Biology, the TU's Graduate Handbook and the website.