

## Mission Statement

We are a Catholic institution of learning dedicated to advancing the frontiers of knowledge in the theoretical and applied fields through quality graduate education that is comprehensive and responsive to the needs of society.

We are committed to the formation of scholars and high-quality professionals who are ethical, competent, compassionate, and committed to the service of their respective professions, the church, the nation, and the global community.

## Vision Statement

We envision a Graduate School that stands for excellence and innovation and that is globally recognized for its distinct degree programs and quality research outputs.

## Goals and Objectives

The Graduate School commits itself to develop:

1. competent professionals who, inspired by the ideals of St. Antoninus of Florence, promote excellence in the production, advancement, and transmission of specialized knowledge and skills in the sciences, the arts, and community service;
2. scholarly researchers and creative thinkers who, kindled by St. Thomas Aquinas' ardour for truth, aspire to become fountains of intellectual creativity and, in their quest for quality research, are proficient and critical in assessing and communicating information in various fields that impact the professions, the church, the nation, and the global community;
3. professional Christian leaders who, touched by St. Dominic de Guzman's apostolic fire and warmed by Mary's motherly care, articulate ethics and truth, high level of moral maturity in resolving issues and promoting social justice and compassion for the poor, and care for the environment;
4. globally engaged citizens who, with ardent advocacy for life, promote a deeper understanding of tolerance and justice as well as linguistic, religious, and cultural diversities as a result of precise evaluation of modern problems and inquiries;
5. committed scholars who, nurtured by the dogmas of Christian faith and values, are dedicated to the pursuit of truth through the promotion of an intellectual culture that values academic rigor and freedom of scientific investigations; and
6. lifelong learners who, empowered by St. Antoninus of Florence's zeal for learning, are committed to the advancement of a higher culture through a continuous search for intellectual inquiries and new knowledge as well as faithfulness to Catholic intellectual traditions.

## Program Intended Learning Outcomes (PILO)

Upon successful completion of the MS major in Biology Program, the graduate will be able to:

1. Solve critically and creatively problems set in biology, and apply biological techniques in research and the academe.
2. Analyze and generate new ideas in biology through research and analysis of given data /information.

3. Work efficiently and effectively in individual- and group-oriented activities in the field, classroom or laboratory setting.
4. Convey biological concepts in a clear and concise manner before a broad range of audience in both written and oral form.
5. Apply biological concepts to address issues in environmental protection, conservation, utilization of natural resources for sustainable and ethical use.
6. Foster the use of knowledge and research to an inquiry-based practice in the field of biology.

## MASTER OF SCIENCE IN BIOLOGY DOCTOR OF PHILOSOPHY MAJOR IN BIOLOGY

### PREREQUISITE COURSES (M.Sc. - 3 UNITS; Ph.D. - 6 UNITS):

#### GS 500 - St. Thomas and Critical Thinking\*

As the philosophical foundation of Research Methodology, it is a study of the principles of and skills in critical thinking according to St. Thomas Aquinas in the three areas of mental cognition: simple apprehension, judgment and reasoning; and of common fallacies towards the acquisition of the art of argumentation.

#### PHL 821 - Philosophy of St. Thomas Aquinas

An exposition of the essential philosophical teachings of the Angelic Doctor organized around the 24 fundamental theses of Thomism against the background of St. Thomas Aquinas' successful synthesis of Scholastic Philosophy, Biblical and Catholic Tradition and Aristotelian Method.

#### PHL 603 - Philosophy of Nature

A background study on the logical structure of hylemorphism and other comparative theories, introduction to the function and meaning of philosophy of science, and of treatises on the philosophy of life, the role of models and paradigms in scientific revolution, processes and interdependence. Practicum in definitional analysis, philosophical reflection on various life and exact scientific specializations.

#### PHL 823 - Philosophy of Values

A survey exposition of the moral philosophies dating back from Socrates, Buddha and Confucius to contemporary moral philosophies around a reflective critique of these in the light of contemporary Catholic moral thought.

\*Ph.D. students who are not graduates of UST for their M.Sc. must take GS 500

### CORE COURSES (M.Sc.-15 UNITS):

#### BIO 600 - Advanced Systematics

A practical knowledge of revisionary taxonomy and the phylogenetic principles. It explores the principles and methods of zoological and botanical/fungal nomenclature, biotic inventory, and description of new taxa, phylogenetic analysis, and classification. Special exercises

will delve into protocols for basic taxonomic studies (including species description), and methods of phylogenetic analysis with a particular emphasis on morpho-anatomical characters.

#### BIO 601 - Advanced Cell & Molecular Biology

Advanced Cell and Molecular Biology focuses on the advanced concepts and applications of cytology and molecular biology. The course tackles the relationship between the cell's molecular structures and functions, the dynamic character of cellular organelles, the use of chemical energy in cellular activities, the unity and diversity at the macromolecular and cellular levels, and the mechanisms that regulate cellular activities.

#### BIO 602 - Advanced Ecology

This course facilitates the recognition of the foundations and basic concepts of ecology and the application of these to current topics on ecology such as landscape ecology and ecosystem management. The basic and advanced concepts of the ecological principles which govern the interactions between plants and animals will be presented.

#### BIO 603 - Advanced Developmental Biology

The study of the structural and physiological changes occurring in a developing vertebrate organism from fertilization, embryogenesis, gametogenesis, metamorphosis, regeneration and growth. Molecular processes involved in differentiation, determination and specialization of embryonic cells are also discussed.

#### BIO 604 - Advanced Genetics

Study of the principles of the molecular and physical bases of biological diversity; the mechanism resulting from these diversities and the principle that govern their heredity from one generation to another.

### SPECIALIZATION COURSES (M.Sc. - 9 UNITS; Ph.D. - 15 UNITS)

#### Molecular Sciences Track

##### BIO 700 - Advanced Virology

A course on modern medical virology, with an emphasis on structure, molecular biology, viral replication, mutations, evolution of viruses, host cell interactions and pathogenesis, as well as diagnosis, control and prevention of infection.

##### BIO 701 - Advanced Immunology

The study of the immune system and the immunological principles at the cellular level from the perspective of cell and developmental biology, and at the molecular level with emphases on the molecular structure of antigen-antibody interactions and gene regulations in view of understanding the medically significant disorders of the immune system.

##### BIO 702 - Current Techniques in Molecular Biosciences w/ Lab

Principles and applications of different molecular techniques to better understand the Molecular Sciences.

##### BIO 703 - Advanced Biochemistry

Advanced topics in biomolecular interactions with emphasis on experimental approaches and problem solving.

#### BIO 704 - Molecular Phylogenetics w/ Lab

Principles of phylogenetic techniques, terminologies and analysis using molecular data.

#### BIO 705 - Bioinformatics

This course is designed to introduce bioinformatics concepts, principles, and techniques within the framework of basic shell scripting and web-based databases/tools

#### BIO 800 - Aquatic Biotechnology

Study of and application of biotechnology for the direct and indirect use of aquatic organisms or parts or products of living aquatic organisms in their natural or modified forms.

#### Plant Biology Track

##### BIO 706 - Plant Morphology & Anatomy w/ Lab

Comparison of plant form and functions.

##### BIO 707 - Field Botany w/ Lab

Survey and collection of botanical specimens and analysis of their ecological distribution.

##### BIO 708 - Bryology w/ Lab

Introduction to the systematics and evolution of bryophytes (mosses, hornworts and liverworts).

##### BIO 709 - Phycology w/ Lab

Introduction to the systematics, identification, morphology and ecology of micro- and macro- algae from marine and freshwater environments.

##### BIO 710 - Ethnobotany

The interaction of people and plants with a broad survey of the diversity of plants described both scientifically and culturally.

##### BIO 711 - Pteridology w/ Lab

Introduction to the systematics and evolution of ferns and fern allies.

##### BIO 712 - Economic Botany

Studies plants that are significant and important to both the ecosystem and the national economy. Traditionally useful plants found growing within an area occupied by a particular community whose culture have some bearing on useful plants are included.

#### BIO 704 - Molecular Phylogenetics w/ Lab

#### BIO 705 - Bioinformatics

##### BIO 801 - Plant Physiology with Lab

Examines plant physiology and relates this to growth and development.

##### BIO 802 - Phylogeny of Land Plants

A broad, evolutionary overview of plant diversity (club mosses and ferns to conifers and flowering plants) based from the currently accepted classification of the APG (Angiosperm Phylogeny Group).

### **BIO 803 - Descriptive Language of Taxonomy**

A practical method of recording taxonomic descriptions for computer processing to generate natural language descriptions, interactive and illustrated identification, and information retrieval.

### **BIO 804 - Plant Pathology**

The scientific study of plant diseases caused by pathogens and environmental conditions.

### **Environmental Biology Track**

#### **BIO 713 - Aquatic Biology**

The ecology of freshwater and marine environments.

#### **BIO 714 - Field Zoology w/ Lab**

The principles and practice of proper sampling, processing and analysis of zoological specimens based on actual field and laboratory exercises.

#### **BIO 707 - Field Botany w/ Lab**

#### **BIO 715 - Terrestrial Biology**

The ecology of terrestrial environments.

#### **BIO 716 - Environmental Microbiology**

This studies the microbial communities and their processes and interactions in the natural environment. It focuses on microbial communities and diversity in aquatic and terrestrial ecosystems and their different metabolic processes in response to biotic and abiotic factors.

#### **BIO 805 - Population Genetics**

The branch of evolutionary biology concerned with the genetic structure of populations and how it changes through time.

#### **BIO 806 - Biogeography**

The study of plant and animal distribution in space and time.

#### **BIO 807 - Biodiversity & Conservation Biology**

The principles and practice of biodiversity and conservation with emphasis on the Philippine setting.

#### **BIO 808 - Ecotoxicology**

Broad overview of different aspects of ecotoxicology, including environmental chemistry, toxicology, ecology and risk assessment related topics.

#### **BIO 809 - Biostatistics for Biodiversity and Ecology**

Introduction to the use of statistical tools and software for interpreting data with emphasis on their application to biodiversity and ecological research.

### **Animal Biology Track**

#### **BIO 717 - Invertebrate Systematics and Evolution**

The evolution and systematics of invertebrate animals starting with a review of basic rules in zoological taxonomy and systematics, natural history collections as well as trace the origins and development of different invertebrate phyla.

#### **BIO 718 - Vertebrate Systematics and Evolution**

The systematics and evolution of major vertebrate phyla based on their morphology, life history and phylogeny. The ecology and the economic and pathological significance of these animals to human life are also discussed.

#### **BIO 719 - Field Zoology w/ Lab**

The principles and practice of proper sampling, processing and analysis of zoological specimens based on actual field and laboratory exercises.

#### **BIO 720 - Animal Behavior**

Basic principles derived from evolution, ecology, ethology and development to explain how and why animals behave as they do in particular situations.

#### **BIO 721 - Protozoology**

The study of the taxonomy, systematics, life history, morphology and ecology of protozoa.

#### **BIO 722 - Advanced Animal Histology**

Presents details of tissue and organ microanatomy, relating structure to function.

#### **BIO 704 - Molecular Phylogenetics w/ Lab**

#### **BIO 705 - Bioinformatics**

#### **BIO 810 - Animal Morphology and Anatomy w/ Lab**

The macroscopic structure, morphology and location of various organs and tissues in the skeletal, muscular, cardiovascular, lymphatic, nervous and sensory systems or representative animal phyla.

#### **BIO 811 - Advanced Animal Physiology w/ Lab**

A comparative approach to the study of morphology and function among representative animal taxa.

#### **BIO 812 - Animal Parasitology w/ Lab**

The systematics and evolution, life history, development and ecology of animal parasites.

#### **BIO 813 - Entomology w/ Lab**

The morphology, anatomy, life history and ecology of different insect taxa.

#### **BIO 814 - Ichthyology w/ Lab**

The diversity, morphology, life history and ecology of fishes.

#### **BIO 803 - Descriptive Language of Taxonomy**

### **TERMINAL REQUIREMENTS (M.Sc. - 9 UNITS):**

Written Comprehensive Examinations (WCE)

TW I - 3 units (Thesis Proposal)

TW II - 3 units (Research Colloquium)

TW III - 3 units (Thesis Defense)

### **TERMINAL REQUIREMENTS (PH.D. - 16 UNITS):**

Written Comprehensive Examinations (WCE)

Graduate Seminar - 4 units (*1 unit for very term for 4 terms*)

DW I - 6 units (Dissertation Proposal)

DW II - 3 units (Colloquium and Publication)

DW III - 3 units (Dissertation Defense)

**Total = 36 units – M.Sc.; 37 units – Ph.D.**

#### **UST Graduate School Administration Officials and Faculty Set-up**

MARILU R. MADRUNIO, Ph.D.  
*Dean*

FR. JOSÉ ANTONIO E. AUREADA, O.P., S.Th.D.  
*Regent*

ALEJANDRO S. BERNARDO, Ph.D.  
*Faculty Secretary*

GRECEBIO JONATHAN D. ALEJANDRO, Dr.rer.nat.  
*Director for Graduate Research*

CHRISTINA A. BINAG, Ph.D.  
*Program Lead  
Natural Sciences*

PROFESSORIAL STAFF  
Grecebio Jonathan D. Alejandro, Dr. rer. nat.  
Pia Marie P. Albano, Ph.D.  
Axel H. Arriola, Ph.D.  
Susan F. Baldia, Ph.D.  
Cecilia I. Banag, Dr.rer.nat.  
Paciente Cordero, D.Sc.  
Thomas Edison E. Dela Cruz, Dr. rer. nat.

Arvin C. Diesmos, Ph.D.  
Irineo J. Dogma, Jr., Ph.D.

Aimee Lyn A. Barrion-Dupo, Ph.D.  
Arnold V. Hallare, Dr. rer. nat.  
Mary Beth B. Maningas, Ph.D.  
Corazon A. Menguito, Ph.D.  
Rey Donne S. Papa, Ph.D.  
John Donnie A. Ramos, Ph.D.  
Maria Cristina R. Ramos, Ph.D.  
Mudjekeewis D. Santos, Ph.D.  
Emerita C. Simeon, Ph.D.



University of Santo Tomas  
THE CATHOLIC UNIVERSITY OF THE PHILIPPINES  
MANILA, PHILIPPINES  
**The Graduate School**

**M.Sc. / Ph.D.**  
**BIOLOGY**