



PhD in Biological and Biomedical Sciences

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Doctoral program in applied areas of biological and biomedical sciences.



The HBKU Biological and Biomedical Sciences (BBS) PhD is a multidisciplinary graduate program that aims to train the next generation of leaders in biomedical sciences.

The PhD degree path offers students an education that provides them with an advanced level of knowledge – particularly in applied areas of biological and biomedical sciences – and develops critical and independent reasoning skills.

Outline for the BBS PhD program

Year 1	Semester 1	Core Classes		
	Semester 2	Core and Elective Classes	BEGIN DISSERTATION RESEARCH	
				RAC meeting
Year 2	Semester 3	Elective Classes	DISSERTATION RESEARCH	RAC meeting
	CANDIDACY EXAMINATION			
	Semester 4		DISSERTATION RESEARCH	RAC meeting
Year 3	Semester 5		DISSERTATION RESEARCH	RAC meeting
	Semester 6		DISSERTATION RESEARCH	RAC meeting
COMPREHENSIVE EXAMINATION				
Year 4-5	Semester 7		DISSERTATION RESEARCH	RAC meeting
	Semesters 8-10		DISSERTATION RESEARCH	
	SUBMIT AND DEFEND PHD DISSERTATION			

Students take their core and elective course requirements in the first two to three semesters in the program and should aim to begin their thesis research no later than the second semester in the program.

During their tenure in the PhD program, students will have regular meetings with their Research Advisory Committee (RAC) -- a committee that will give advice and help oversee the student's progress.

In Year 2, students take the Candidacy Examination. This exam determines whether the student is ready to begin a period of research aimed towards a doctorate degree. The examination provides the Candidacy Examination Committee and the student with means to assess the student's mastery of the basic body of knowledge and development of the breadth and depth of scholarship that is expected of PhD candidates.

After Year 3, students take the Comprehensive Examination. This exam allows the Graduate Advisory Committee to thoroughly examine the student's preparation for dissertation research. Successful completion of the comprehensive examination indicates that the student has a broad and in-depth background in biomedical sciences. It marks the watershed from taking courses to being a full-time researcher.

To obtain their PhD, a student will have to write their dissertation and successfully defend it orally.

Curriculum

A 54-credit program, taught in English over four to five years, that includes:

- **Core Courses**

- **Elective Courses**

4 Core Courses

A list of BBS Core courses:

LS 501 Research Methods and Ethics

This course is a foundational course for graduate students who will be engaged in research. It provides students with an introduction to ethics and ethical misconduct, intellectual property and environmental health and safety as well as scientific thought and design of experiments. A focus of the course is to transition students from textbooks to primary literature as their main source of information.

CSE 502 Statistics for Science and Engineering

This is an introductory course on probability theory and statistics, which will cover fundamental principles of statistics and their applications in science and engineering.

Course topics will include:

1. Basic probability theory
2. Random variables and probability distributions
3. Hypothesis testing
4. Analysis of variance
5. Regression
6. Design and analysis of experiments, and other relevant topics.

LS 640 Stem Cell Biology

This course is intended as an introduction and in-depth discussion focused on the biology of stem cells. The course will introduce the features of stem cells and basic mechanisms regulating their self-renewal and pluripotency. In addition, the course will focus on selected examples of adult stem cells with an introduction to translational medicine approaches involving stem cell biology.

Major emphasis will be placed on how advances in stem cell biology and tissue engineering can be applied to the use of embryonic and adult stem cells in regenerative medicine. In addition to these topics, students will be introduced to the ethical, regulatory, and legal issues related to stem cell research.

LS 651 Principles of Cellular and Molecular Immunology

The field of immunology has witnessed a huge surge in knowledge in the last 40 years. From relatively modest and rather esoteric beginnings, immunology has become one of the most dynamic and exciting areas of medical sciences. This course encompasses the major sub-disciplines in the field. These will include, but not be limited to, development and maturation of the various cell lineages of the immune system, phylogeny and structure-function relationship of cell-associated as well as soluble receptors used by the immune system, the mechanisms of antigen processing, presentation, and recognition, properties of innate vs. adaptive immune responses, communication and cell-cell interactions, immunoregulation, and humoral and cellular effector mechanisms.

LS 653 Environmental Microbiology

This course provides students with knowledge in microbial communities and their distribution in the environment; microbial pathogens and their transmission pathways in water, air, soil and food; and the various sources of microbial contamination in the environment. This course also covers environmental applications of molecular technology and other advanced detection tools. Furthermore, emerging issues, such as health implications of nanotechnology, renewable energy, climate change and infectious disease, urban microbiology, and food safety will be discussed to give insight to future environmental health concerns.

LS 606 - Molecular Biology of Neuroscience

This course is intended for graduate students interested in gaining a detailed understanding of molecular mechanisms underlying synaptic function and development. Throughout the course, the focus will be on understanding the experimental approaches that produced current knowledge. In most weeks, students will be assigned recent research papers as their primary reading material. About 2/3 of the classes will be lectures by the instructor and 1/3 will be student led discussions of papers.

LS 633 - Epigenetics

The aim of the course is to provide an introduction to epigenetics and chromatin dynamics, particularly the structural and biochemical modifications of chromatin that underlie epigenetic states and their effects on gene expression and human diseases. The importance of epigenetic states is perhaps the major discovery of molecular biology in the past ten years. They are critical to understanding the control of gene expression in development, the programming and reprogramming that takes place in the differentiation of pluripotent stem

cells and they provide an accounting for many of the genomic malfunctions that result in human disease. An acquaintance with the concepts of what has come to be known as Epigenomics is essential for a Molecular Biology major.

LS 706 Independent Study

Independent Study in Life Sciences allows students to examine a variety of timely, cutting-edge research areas. Taught by our faculty or/and research scientists from our research institutes or industrials, this course allows students to keep up with critical trends and topics in the field. Registration for this course requires Program Coordinator and Instructor approval. In addition, a student can only register for this course once during their tenure at HBKU.

LS 661 Special Topics in Biosensors

This course provides a comprehensive, bottom-up coverage of how biosensors are engineered starting from physical transduction and electrical detection all the way to signal conditioning and processing. The course is structured around sensing principles including physical phenomenon as well as electronics (VLSI circuits) of the different sensory systems and processing of biosensing signals.

List of Courses

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YOU MAY WANT TO CHECK



Research

Research is integral to Hamad Bin Khalifa University's mission to help build human capacity in Qatar, playing a pivotal role in HBKU's academic programs across all its colleges.

- [Qatar Environment and Energy Research Institute \(QEERI\)](#)
- [Qatar Biomedical Research Institute \(QBRI\)](#)