

INFECTIOUS DISEASE AND HOST DEFENSE (IDHD) TRACK GRADUATE STUDENT HANDBOOK

Track Director: Dr. Jonathon P. Audia

Overview

The impact of infectious diseases on human health is on the rise, with new diseases emerging and old formerly controlled pathogens making a comeback. A host of factors are involved in this resurgence including the increase and urbanization of human populations, the improved opportunity for transmission through arthropod vectors, the increase of antibiotic resistant bacteria, and the lack of effective diagnostics, therapeutics, and vaccines. Understanding the factors involved in pathogenesis and transmission along with key aspects of host defense requires a multidisciplinary approach pursued by investigators with expertise in a variety of fields including microbiology, immunology, cell biology, and vector biology. Thus, the IDHD track is designed to prepare students for the interdisciplinary nature of infectious disease research.

Mission Statement

The mission of the IDHD Track is to develop outstanding new scientists for a wide range of career opportunities involving microbiology and immunology in academic, clinical, industrial, and government settings. To meet this goal, students are trained to rigorously investigate cellular and molecular mechanisms underlying microorganism life styles, immune defenses, host-pathogen interactions, and transmission, and to effectively evaluate and communicate scientific information.

Faculty Affiliated with the IDHD Track:

Name	Department
Audia, Jonathon	Microbiology and Immunology
Barrington, Robert	Microbiology and Immunology
Macaluso, Kevin	Microbiology and Immunology
Hermance, Meghan	Microbiology and Immunology
Rayner, Jon	Microbiology and Immunology
Kim, Jin	Microbiology and Immunology
Davies, Christopher	Biochemistry and Molecular Biology
Borchert, Glen	Pharmacology
Honkanen, Rich	Biochemistry and Molecular Biology
Richter, Wito	Biochemistry and Molecular Biology
Tambe, Dhananjay	Physiology/Engineering
Sayner, Sarah	Physiology and Cell Biology
Calderon, Eduardo	Internal Medicine
Custodio, Haidee	Pediatrics
Hassouneh, Linda	Pediatrics
Vande Waa, John	Internal Medicine
Foster, John (Emeritus)	Microbiology and Immunology
Wood, David (Emeritus)	Microbiology and Immunology
Lausch, Robert (Emeritus)	Microbiology and Immunology

Courses and Curriculum

The table below outlines the planned progression through the BMS core curriculum and the IDHD Track. During the first year, through discussions and laboratory rotations (IDL 594), students begin the process of selecting a dissertation mentor. Selection of a mentor must be completed by the end of Year 1. This is followed by the selection of a Dissertation Committee consisting of at least four additional members. Students are encouraged to enlist faculty members from outside of the department and/or outside of the institution to provide expertise necessary to their project.

	Fall	Spring	Summer
Year 1	<input type="checkbox"/> IDL 580 <input type="checkbox"/> IDL 577 (Methods) <input type="checkbox"/> IDL 576 (Lit Reports) <input type="checkbox"/> GIS 501 (RCR) <input type="checkbox"/> IDL 594 (Rotation 1)	<input type="checkbox"/> IDL 581 <input type="checkbox"/> IDL 576 (Lit Reports) <input type="checkbox"/> IDL 594 (Rotations 2, 3)	<input type="checkbox"/> BioStats <input type="checkbox"/> IDL 594 (Rotation 4, if needed) or MIC 537 (Directed Studies for students who matriculate into Track)
Year 2	<input type="checkbox"/> MIC 530 (Microbes and Host Defense) <input type="checkbox"/> MIC 590 (Special Topics—Introduction to Scientific Writing: Literature Reviews) <input type="checkbox"/> MIC 536 (Literature Reports) <input type="checkbox"/> MIC 537 (Directed Studies)	<input type="checkbox"/> Advanced Coursework (<i>one of</i> MIC 630 Pathogenesis, MIC 632 Immunology, MIC 633 Virology) <input type="checkbox"/> MIC 590 (Special Topics—Introduction to Writing a R21 Proposal) <input type="checkbox"/> MIC 536 (Literature Reports) <input type="checkbox"/> MIC 537 (Directed Studies)	<input type="checkbox"/> MIC 537 (Directed Studies) <input type="checkbox"/> Qualifying Exam
Year 3-5	<input type="checkbox"/> MIC 536 (Literature Reports) <input type="checkbox"/> MIC 799 (Research and Dissertation)	<input type="checkbox"/> MIC 536 (Literature Reports) <input type="checkbox"/> MIC 799 (Research and Dissertation)	<input type="checkbox"/> MIC 799 (Research and Dissertation)

Students must maintain a cumulative “B” average in their coursework to remain in good academic standing.

LEGEND

BMS Core Curriculum

Year 1	IDL 580	Fundamentals of Biomedical Science I
	IDL 581	Fundamentals of Biomedical Science II
	IDL 576	Literature Reports
	IDL 577	Introduction to Research Methods
	IDL 594	Directed Studies Rotation

GIS 501 Responsible Conduct of Research
MIC 590 Special Topics (Summer Semester)

IDHD Core Curriculum

Year 2 All of the following courses:

MIC 530 Microbes and Host Defense
MIC 536 Literature Reports (IDHD Journal Club)
MIC 537 Directed Studies
IDL 640 Statistics and Experimental Design in Biomedical Research
MIC 590 Special Topics (Fall and Spring Semesters)

Plus one of the following advanced courses*:

MIC 630 Advanced Microbial Pathogenesis
MIC 632 Advanced Immunology
MIC 633 Advanced Virology

*Pre-requisites for advanced courses are IDL 580, IDL 581 and MIC 530

Additional Track Requirements

- Attendance at the College of Medicine Distinguished Scientist Seminars.
- Elective courses as suggested by the student's Dissertation Committee.
- Dissertation Committee meetings and progress reports as described by the Graduate doctoral program.
- Written prospectus and oral defense of the prospectus (see below).

Qualification Examination

The IDHD Track Qualification Examination will consist of a written prospectus accompanied by an oral defense of the prospectus. The Examination Committee will consist of the student's selected Dissertation Committee members plus a faculty member outside of the Dissertation Committee who will serve as Chair. The student and their faculty mentor will work to identify an Examination Committee Chair. Final approval of Examination Committee Chair at the discretion of the Chair of the Department of Microbiology and Immunology. This examination will follow a format similar to that outlined in the BMS Student Handbook (see <https://www.southalabama.edu/colleges/com/doctoral-program/resources/bms-handbook.pdf>) with the following specifications.

Written Prospectus

The written prospectus will follow the format of a NIH R21 grant proposal and a substantive draft of this document will be prepared as part of MIC 590 Special Topics Introduction to Writing a R21 Proposal (described below). Students are **not** expected to generate and include substantial preliminary data to support the technical and conceptual feasibility of the hypothesis proposed for testing. Although preliminary data are permitted, the purpose of this written examination is to determine whether the student is able to use the primary literature to identify a knowledge gap in their selected field of study and then develop a clear and testable hypothesis based on the identified problem. The student is expected to develop a rigorous experimental design with clear descriptions of expected outcomes, alternative outcomes, and alternative approaches. As a supplement to the R21 Proposal, students will also prepare a comprehensive literature review that will be substantively developed as part of MIC 590 Special Topics Introduction to Scientific Writing: Literature Reviews. Both documents will be distributed to the Examining Committee at least 2-weeks prior to the scheduled date of defense.

Oral Defense of Prospectus

The written Prospectus will serve as the basis for the oral defense. Students will prepare a 50 minute seminar to provide background on the topic followed by an outline of the overall research strategy and anticipated results, alternative outcomes, and alternative approaches. The students should also include an overall interpretation and impact of the proposed studies. The format for this seminar is left to the discretion of the Examination Committee as to whether questions will occur throughout the seminar or left to the defense phase. Upon completion of the seminar portion, the oral defense of prospectus will be led by the Examination Committee Chair. Students should expect that the Examination Committee will ask questions pertaining to the body of the prospectus, but will also ask questions to determine the student's knowledge of basic sciences and aspects specific to their selected field of study. Upon conclusion of the defense, the student will be excused from the room and the Examination Committee will deliberate the student's performance on both the written and oral components. A passing grade requires a majority of the Examination Committee agree to pass the student on **both** the written and oral phases of the examination. Any component of the examination the student does not pass will be subject to a retake at the discretion of the Examination Committee.

Brief Course Descriptions (see course syllabi for further details)

MIC 530 Microbes and Host Defense (3 credit hours)

This course will build upon the foundation of basic immunology and microbe structure, metabolism, and genetics that was established in the Year 1 IDL courses to expand the student's knowledge of microbial pathogens (bacteria, fungi, parasites, and viruses), the clinical diseases involved, and the host response to specific pathogens. Special emphasis will be placed on recognizing targets for new antimicrobials and the development of effective vaccines and diagnostic tools.

MIC 630 Advanced Microbial Pathogenesis (3 credit hours)

This course will provide state-of-the-art knowledge on selected topics in microbial pathogenesis, including molecular mechanisms and emerging technologies. The course offers an integrated view of the genetics and biochemistry of microbial structures in bacteria and fungi of medical importance. Assignments will cover advanced information on topics such as microbial structures, protein secretion, uptake of nutrients and other molecules, global regulatory signals and signal transduction pathways, lifestyles of intracellular and extracellular bacteria, aspects of innate immunity, mobile genetic elements, toxins, and microbial interactions with host cells.

MIC 632 Advanced Immunology (3 credit hours)

This course provides an in depth analysis of selected topics in immunology. The course is centered around formal presentations followed by student presentations. Design and interpretation of immunological experiments are emphasized throughout the course.

MIC 633 Advanced Virology (3 credit hours)

This course reviews the reproductive cycle of important human viruses and subviral agents and the diseases they cause. The focus is on the molecular biology of animal viruses and their mechanisms of regulation, assembly, and pathogenesis. Human immunodeficiency virus and other viruses of current interest will be considered in detail. The course is constructed as an interactive lecture series with student reports and literature surveys.

MIC 590 Special Topics (1-3 credit hours)

This course will be taken by students over three consecutive semesters and will cover the following special topics.

Introduction to Literature Reports – The goal of this section is to introduce students to reading the scientific literature. Students will work with their mentor to select papers to read. Then students will prepare a brief summary for each paper that will be evaluated by the mentor.

Introduction to Scientific Writing: Literature Reviews – The goal of this section is to instruct students on how to prepare review-style scientific articles summarizing the work in their chosen field of study. Students will build on the Introduction to Literature Reports and begin developing their written summaries into a review that will be supplemented with summaries of additional papers. Students will work with their mentors to identify the relevant literature and begin to integrate what has been done with what needs to be done to move the field forward. This exercise will prepare students for preparation of their Written Prospectus.

Introduction to Writing a R21 Proposal – The goal of this section is to instruct students on how to prepare grant proposals using the NIH R21 format. Students will work with their mentor to identify possible topics to be developed. In-class sessions will provide guidance, tips, and feedback on progress. At the end of the section student proposals will be evaluated in a 'mock Study Section'. This exercise will prepare students for preparation of their Written Prospectus.

IDL 640 Statistics and Experimental Design in Biomedical Research

The course focuses on common statistical methods used to evaluate data in biomedical research as well as logic and hypothesis-driven experimental design. The course will utilize a combination of lectures, writing assignments, discussion of statistics in published work, analysis of practical data sets, and assigned reading.

MIC 537 Directed Studies (1-6 credit hours per semester)

Students participate in research under the direction of a graduate faculty member. The student may pursue independent research or participate in a literature project.

MIC 799 Research/Dissertation (1-6 credit hours per semester)

Independent research by the student under the sponsorship of the graduate faculty in the individual departments in the Basic Medical Sciences.

Detailed Course Descriptions**MIC 536 Literature Reports (IDHD Journal Club)****Overview**

The purpose of IDHD journal club is to provide scholarly reviews of recently published, insightful articles relating to the areas of infectious diseases and host defense. The format is an interactive, open forum with a primary presenter and the full participation of the audience. This journal club provides a learning environment for the critical analysis of journal articles, development of presentation skills, and evaluation of experimental design/research methods.

Scheduling and Oversight

IDHD journal club meets on designated Mondays from 12 to 1 pm in the MSB Multi-Purpose Room (MSB 3270). The J.J. Bitzer Conference room (MSB 2080) or the D.O. Wood Conference room (LID Building) may be used as alternative sites as needed. Students will be given an opportunity to sign up for journal club slots at the beginning of the Fall and Spring semesters. A schedule will be posted on the IDHD website at the beginning of the academic year and shared through the Google Drive. IDHD journal club is coordinated by a Faculty Advisor (FA) in cooperation with the Department of Microbiology and Immunology (DMI) Administrative Assistant. The FA is appointed by the Track Director and serves a term of 2 years. The FA ensures that journal club articles are distributed via e-mail one week prior to each presentation and coordinates scheduling. The FA also monitors student participation and provides advice and constructive feedback to students.

Participation and Attendance

IDHD graduate students are **required** to participate in this journal club beginning in their second year and continuing throughout their tenure in the graduate program. Each student must present at least once per semester (twice per academic year). IDHD graduate students are required to attend journal club. However, in the event of a necessary absence (for example: illness, family emergency, attendance at scientific conference), the graduate student must clear the absence with the FA. Attendance will be monitored by the FA and will influence student grades for journal club.

Postdoctoral fellows are **expected** to attend journal club and to present a paper once per academic year.

Faculty members are **expected** to attend journal club and strongly **encouraged** to present a paper once per academic year.

Requirements and Evaluation

IDHD graduate students must select a peer-reviewed journal article and obtain approval from their mentors to present the article. The article (in PDF format) along with confirmation of mentor approval should be provided to the FA one week prior to the presentation date. Second and third year students (pre-candidates) are encouraged to present articles related to their area of research. Fourth and fifth year students (candidates) are encouraged to be more adventurous and select articles that may be outside of their research area that they expect to be particularly important or interesting to journal club participants.

The FA provides an electronic version of the evaluation indicating a satisfactory or unsatisfactory grade, which becomes part of the student's academic record. If a student's presentation is judged to be unsatisfactory, he or she will be required to make an additional journal club presentation during that semester. The written evaluation will clearly state why the presentation was unsatisfactory and offer constructive advice for the student. Evaluation criteria includes: Effectiveness of communication, Quality and clarity of visual aids, Depth of material covered, Knowledge of the topic, Ability to answer questions and to think critically, and an Overall score.

IDHD graduate students are required to complete peer-evaluation forms following each student journal club presentation. These forms are to be completed and submitted electronically. The presenter and their mentor will be provided access to the peer-evaluations. Each student's overall grade for this journal club will be a combination of both attendance and participation. Postdoctoral fellows and faculty should select and present a peer-reviewed journal article that they feel will be of general interest to all journal club participants. All journal club participants are expected to have read the journal articles to be presented prior to each meeting.

Guidelines for Presenters

- Choose an appropriate journal article.
- Read and understand the article thoroughly enough to present the major research findings and lead discussion.
- Prepare your presentation using Powerpoint. Plan for a 30 minute talk (maximum) so that there is time for discussion during the course of the presentation. Some points to consider:
- It is not necessary to cover every figure in the paper (particularly in papers with extensive online supplements). Rather, you should try to cover the important findings and the conclusions the authors have drawn.
- Be prepared to explain any non-standard techniques or methodologies, but do not dwell on the details and “nitty-gritty” information of standard procedures. It is important to consider whether the data are of sufficient quality and whether the data support the authors' conclusions. If you feel there are potential weaknesses in the work, be prepared to point these out. However, remember that it is not your job to either refute or to defend the paper. Your job is to share the paper with the audience and to lead discussion. For these reasons, **it is critical to select a quality paper that is appropriate for the IDHD Journal Club.**
- Be prepared to discuss new questions the paper raises and the potential future directions