3.4 Curriculum Information (PhD Programme in Integrated Biology and Medicine)

PhD Programme in Integrated Biology and Medicine

The Duke-NUS PhD programme in Integrated Biology and Medicine provides training in translational bioscience, covering a broad spectrum of disciplines including cell and molecular biology, biochemistry, physiology, and health policy. During the first semester students complete a core course entitled “Molecules to Medicines” where they learn fundamentals in biomedical research, while simultaneously conducting two laboratory rotations. Subsequently, students choose a thesis mentor and complete their advanced training in one of five specialty tracks:

- Cancer and Stem Cell Biology
- Emerging Infectious Diseases
- Cardiovascular and Metabolic Disorders
- Neuroscience and Behavioral Disorders
- Health Services and Systems Research

The degree, which will take on average 4 to 5 years to complete, culminates with the development of a written thesis and a successful oral dissertation defense.

Like the Duke-NUS MD programme, the Ph.D. core course incorporates a novel education strategy which rapidly transitions students to a mode of learning better suited for a lifelong career in biomedical research. From the first week in the programme, students are introduced to scientific literature searches, evaluation and critique of seminal scientific papers. The core curriculum is delivered in a small group collaborative learning environment that reinforces critical thinking and public debate. An overview of the curriculum follows.
### Year 1 - Required coursework and lab rotations

All PhD candidates participate in the 15-week core course called “Molecules to Medicines” during their first semester of the PhD programme. This course introduces students to translational research, and provides training on experimental models, methods and mechanisms that drive current investigations into human disease. Scientific ethics training is woven throughout the course. This course is taught by a range of Duke-NUS faculty and staff who introduce their expertise to the students. This is not a lecture course, but an interactive learning course that requires significant preparation and participation.

Students will also conduct three 6-week lab rotations from among the Duke-NUS Signature Research Programmes. Mentors for the rotations must be regular ranked faculty and be on the approved mentor list. These rotations are structured to provide students with first hand exposure to the labs where they may choose to conduct their PhD research. At the end of the rotations, students will be asked to commit to a thesis mentor and a specialty discipline.

During the second semester, students may continue with coursework and/or begin primary research.
Specifics will be dependent on the specialty areas students choose to pursue.

**Year 2 - Developing a thesis and qualifying exam**

At the start of the second year, students will work toward developing their thesis projects. Students may or may not continue with formal coursework, however, all PhD candidates are expected to actively participate in Duke-NUS research seminars and Journal Clubs sponsored by their Signature Research Programmes. These seminars provide students with a forum to give oral presentations, evaluate literature, analyze competitive science, and share ideas on major breakthroughs and future directions for their research field. This activity provides a critical foundation for a career in translational research.

In the first semester, all PhD students take a qualifying or preliminary exam. Successful students will defend a mock grant proposal, providing the faculty with the opportunity to evaluate their fundamental knowledge and ability to pursue hypothesis-based research.

**Years 3 & 4 - Research and thesis**

After the qualifying exam, the remainder of the PhD training consists of the execution of the thesis project and regular participation in Research Seminars and Journal Clubs. The thesis mentor will guide the student and act as the chair of the student’s Graduate Thesis Advisory Committee. Success of the thesis will be judged by the publication or anticipated publication of two quality first author papers, with the emphasis being on quality.