Curriculum Map for Tropical Medicine MS

STUDENT LEARNING OUTCOMES

1. Demonstrate a knowledge base in the various disciplines of Tropical Medicine.

In all graduate courses offered by our department, students are required to be familiar with the background literature as well current information on topics covered in lectures which include trends in understanding use of new technology and the underlying mechanisms involved in disease processes. Development of a knowledge base in Tropical Medicine is achieved through our core courses in infectious disease microbiology (TRMD 604, 605, 608) and a series of advanced courses in each of the sub-disciplines. This is supplemented by additional elective graduate courses in cell and molecular biology, epidemiology, research ethics, microbiology and immunology offered by other university departments.

In advanced courses in Bacteriology, Immunology, Parasitology and Virology, topics are selected (often in consultation with the students) for in depth study of molecular mechanisms of pathogenesis of the disease, fundamental nature of innate and acquired immunity, molecular and genetic mechanisms involved in the evolution of new type of invasive microbes, drug treatment and resistance, and disease prevention by killed or live attenuated vaccines. Topics also cover impediments which exist in society to availability of drugs and vaccines for disease treatment and prevention.

2. Demonstrate a mastery of technical and experimental research methodologies.

Typically, advanced courses and journal clubs offered by the department involve the review of key historical as well as current published papers on selected topics by students and faculty. Emphasis is placed on analysis of experimental design and methodologies and assessment of the scientific validity of experimental data and the overall significance to the field.

The curriculum includes a laboratory rotation course (TRMD 609) which entails the training of students in laboratory techniques utilized in infectious disease research and introduces them to specific experimental approaches utilized in the research areas of faculty mentors. These techniques include but are not limited to molecular methodologies, immunological assays, cell culture, virological methods, parasitological methods, bioinformatics and biostatistics, and flow cytometry. In this course, students are required to maintain a laboratory notebook and prepare written laboratory reports for each rotation.

3. Demonstrate the ability to plan, execute, interpret, and evaluate experimental studies.

The most important framework for professional development is the thesis research in the case of Plan A MS students, the non-thesis research project for Plan B MS students, and the dissertation research project for PhD students. Development of a written and oral research proposal in each instance provides a foundation for future research design and grant preparation. This research proposal is written in the format of an NIH grant application and also serves as the basis for the PhD comprehensive examination. The research project provides the ideal hands-on experience for execution, interpretation and evaluation of experimental studies and the foundation upon which the student will be able to evaluate the work of his/her peers. In addition to the experimental aspects of the project, preparation of the written thesis document is a critical aspect of training in conducting a comprehensive literature review and preparation of a scientific document. Generally, the thesis or dissertation research

provides the foundation for research manuscripts prepared by the student in collaboration with the faculty mentor and are subjected to external peer review.

5. Demonstrate skills required for instruction, assessment and mentoring of undergraduate and MS students.

Advanced students are also given the opportunity to prepare guest lectures for selected graduate courses which are critiqued by the supervising faculty. In addition to providing students with an opportunity to improve communication skills, these learning environments enable them to observe and practice group interaction and leadership skills.

Mentoring skills are developed largely as a result of modeling of these skills by the student's research advisor, members of the student's advisory committee, and other department faculty. Direct experience in mentoring is often provided by interaction, one-to-one instruction and supervision by senior graduate students of undergraduate volunteers and beginning graduate students.

6. Demonstrate proficiency in written and verbal communication skills in various teaching formats and in professional presentations.

Students are provided with several opportunities to develop verbal communication skills. Many courses require oral student presentations to peers as well faculty after which feedback is provided. In addition, students are required to make a seminar presentation before the entire department once each year which is evaluated by the seminar faculty coordinator and research mentor. Finally, students are given the opportunity to serve as teaching assistants in the undergraduate Biology and Microbiology programs at UH Manoa for one or more semesters if they wish to gain additional teaching experience. Many students have taken advantage of this option and have gained a great deal from this experience in addition to receiving a stipend for their work.

7. Develop sufficient mastery and scientific maturity to assess the work of peers in related fields.

Students participate in departmental journal clubs (TRMD 699 Directed Reading) which review primary literature in the various disciplines of Tropical Medicine. In these sessions, students select journal articles and present them to the class. Class participants are expected to read each article and be prepared to discuss the methodology and experimental results, evaluate the validity of the conclusions advanced by the authors, and assess the overall significance of the work to the field.

MS/PhD Curriculum Map								
	Intended Student Learning Outcomes*							
Course or Activity	Tropical Medicine Knowledge Base	Mastery of Research Methods	Experimental Design & Execution	Instructional and mentoring skills	Written & verbal communication skills	Peer evaluation & assessment	Manuscript, grant proposal & course development skills	Research laboratory administration skills
TRMD 603, 604, 605, 608	I, A			I , R	R	R		
TRMD 601, 606		I	I, R		I, R		I	
TRMD 607, 609, 650, 653, 671, 672, 673, 705	R, A	R, A	R	I	R			
TRMD 690	I, R	I, R	I, R	I, R	I, R, A	I, R	I, R	
TRMD 699		R	R		R		R	I
TRMD 700		R, A	R, A		R, A		R	R
TRMD 800		M*, A	M, A		M, A		M	R
Supervision of undergrad & junior grad students				R		R		I

*"I"=introduced; "R"=reinforced and opportunity to practice; "M"=mastery at the senior or exit level; "A"=assessment evidence collected