Academic Program: Tropical Medicine       Degree(s): MS & PhD

Graduate Assessment by Degree/Certificate Program

I. List in detail your student Learning Outcomes (SLOs) for each graduate degree/certificate offered.

   A. Master of Science in Biomedical Sciences (Tropical Medicine)
      1. Demonstrate a fundamental knowledge base in the major subdisciplines of the field of Tropical Medicine: bacteriology, virology, mycology, parasitology, immunology, molecular epidemiology, and microbial ecology.
      2. Demonstrate a mastery of technical and experimental methodologies required to conduct research in the field of Tropical Medicine.
      3. Demonstrate the ability to plan, execute, interpret, and evaluate experimental studies in Tropical Medicine.
      4. Demonstrate skills required for instruction, assessment and mentoring of undergraduate and MS level students.
      5. Demonstrate proficiency in written and verbal communication skills in classroom lectures and other teaching formats and in professional seminars and presentations.
      6. Demonstrate sufficient mastery and scientific maturity to assess the work of peers in related fields.

   B. PhD in Biomedical Sciences (Tropical Medicine)
      1. Demonstrate an advanced knowledge base in the major subdisciplines of the field of Tropical Medicine: bacteriology, virology, mycology, parasitology, immunology, molecular epidemiology, and microbial ecology.
      2. Demonstrate a mastery of technical and experimental methodologies required to conduct research in the field of Tropical Medicine.
      3. Demonstrate the ability to plan, execute, interpret, and evaluate experimental studies in Tropical Medicine.
      4. Demonstrate skills for instruction, assessment and mentoring of undergraduate, MS and PhD level students.
      5. Demonstrate skills to verbally communicate scientific concepts and results in classroom lectures and other teaching formats and in professional seminars and presentations.
6. Demonstrate written communication skills as required in various professional duties including manuscript preparation for scientific publication, preparation of research grant applications, preparation of lecture notes, development of introductory and advanced courses in related disciplines.

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

8. Develop administrative skills to manage a research laboratory, supervise technical and professional staff, and assume responsibilities and provide leadership as a faculty member.

II. Where are these SLOs published (e.g., departmental web page)?

These SLOs are published in the departmental web page and student handbook.

III. Explain how your SLOs map onto your curriculum, i.e., how does your program of graduate studies produce the specific SLOs in your students?

In all graduate courses in our department, students have to be familiar with historical background as well current information about topics covered in lectures which include trends in understanding use of new technology and understanding of the mechanisms involved in disease process. Development of a knowledge base in Tropical Medicine is achieved through our core course series in infectious disease microbiology (TRMD 604-605) and advanced courses in each of the subdisciplines. This is supplemented by additional graduate courses in cell and molecular biology, epidemiology, microbiology and immunology offered by other university departments.

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

Typically, advanced courses 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 conclusions.

The curriculum includes a laboratory course (TRMD 609) which entails the training of students in a wide range of laboratory techniques utilized in infectious disease research. These techniques include molecular methodologies, immunological assays, cell culture, virological methods, parasitological methods, bioinformatics, and flow cytometry. In this course, students rotate through the different laboratories of departmental faculty with
specific methodologies covered in each laboratory module. They are required to maintain a laboratory notebook and prepare written laboratory reports for each section of the course.

Students are provided with several opportunities to develop verbal communication skills. Many of the advanced courses require oral student presentations to a small group of faculty and peers 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. Advanced students are also given the opportunity to prepare guest lectures for selected undergraduate courses in microbiology which is 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.

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. 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. Often, the thesis provides the foundation for research manuscripts prepared by the student and subjected to peer review.

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 first year graduate students. Administrative skills for laboratory management and professional leadership are learned through participation in day-to-day operations of an active research laboratory.

IV. What population(s) is covered by your assessment(s)?

All MS (Plan A and Plan B) and PhD students are covered by our assessment.

V. Please list/describe all the assessment events and devices used to monitor graduate student progress through the program. Consider the following questions:

A. How are written exams used to assess graduate students?

B. How are independent and/or culminating projects (theses, dissertations, performances, capstone courses, etc.) used to assess graduate students?

C. How are oral presentations/reports/performances used to assess graduate students?
A. All students enrolled in our graduate programs are given a **general, diagnostic exam** during their first year of graduate study. This written, short essay examination is intended to assess the student’s basic understanding and knowledge of major concepts in the field of Tropical Medicine. Evaluation of the student’s performance on this exam by a faculty committee is used to develop an appropriate curriculum in order to fulfill student learning objectives for the particular degree program and to prepare the student to challenge the qualifying examination described below.

All students are required to take a **qualifying examination** after their 1st year of graduate study. This general knowledge examination covers the major disciplines of Tropical Medicine including Bacteriology, Immunology, Parasitology and Virology as well as related areas such as molecular biology, epidemiology, and microbial ecology. This written exam and oral follow-up are prepared and administered by an advisory committee comprised of faculty members in each discipline. Questions for the qualifying exam for predoctoral students are more detailed and challenging than the MS qualifying exam. Proficiency in the various areas of Tropical Medicine must be demonstrated in order for students to be advanced to candidacy in their degree program. Students failing certain sections of the exam are allowed to retake those portions, or the entire exam, after appropriate remedial work or additional coursework. This exam also is used to determine whether to encourage a student to proceed to the PhD or to recommend a terminal MS degree.

MS Plan B (non-thesis) students are required to take a comprehensive written final examination demonstrating a sound understanding of the various fields encompassed by Tropical Medicine as well as an in depth understanding of the areas related to their research project. This examination is conducted by the candidate’s advisory committee. Although the areas covered by this exam are similar to those evaluated in the qualifying exam, it is expected that the answers provided by students at this level will be more detailed and advanced. Students failing this exam are allowed to retake a portion or the entire exam after a sufficient study period.

In addition to the examinations described above, several of the core courses administer written examinations at regular intervals (midterm exams) as well as a final examination at the end of the course. For advanced courses, these exams may be substituted by term papers or oral presentations on a subject selected by student and the faculty instructor. These papers and presentations are evaluated by the faculty instructor.

B. All culminating projects are evaluated by an advisory committee under the leadership of the student’s major advisor. This advisory committee consists of faculty within the graduate program with expertise in the various programmatic disciplines as well as an external member representing the UHM academic community at large. Assessment of the culminating project is based on a demonstration by the student that he/she has demonstrated proficiency in the area of specialization within the field of Tropical Medicine commensurate with the expectations of the specific degree, has produced a body of work which is on par with program expectations for the specific degree, and
has effectively communicated and defended this body of work in an oral seminar before departmental faculty and a written paper (MS Plan B), thesis (MS Plan A), or dissertation (PhD).

C. As described above, student oral presentations are assessed by individual course instructors, members of the student’s advisory committee, and the student’s major adviser. These oral presentations include annual departmental seminars, oral reports required by specific courses, research proposal presentations, progress reports to the advisory committee, and the final seminar and defense of the thesis/dissertation.

VI. Please list/describe how your graduate students contribute to your discipline/academic area? Consider the following questions:

- To what extent do your graduate students present their work at professional conferences?
- To what extent do your graduate students publish their work?

Since Tropical Medicine & Medical Microbiology is multi-disciplinary subject, all of our graduate students contribute to broadly based aspects of the field. All graduate students are encouraged to participate in the school-wide Annual Biomedical Symposium sponsored by JABSOM. Students prepare an oral presentation or participate in a poster presentation and these presentations are evaluated by faculty judges. Students also participate in the Fall and Spring meetings of the local chapter of the American Society of Microbiology by presenting their research findings in oral or poster presentations which are evaluated by senior members of this professional society.

Travel funds are available competitively through local and national sources for advanced students to participate in the annual, national meetings of the American Society of Tropical Medicine & Hygiene, the American Society for Microbiology, as well as other professional societies and organizations. Alternatively, some students attend these meetings through support from research grants to their faculty mentor. In the past, additional travel funds from training grants have enabled students to make presentations at national and international meetings. A list of some of the recent student presentations is provided in Table 1.

Students often have published their research in peer-reviewed journals during and following completion of their graduate studies. A partial list of published papers co-authored by graduate students in the Tropical Medicine graduate program in the past five years is provided in Table 2.

VII. What attempts are made to monitor student post-graduate professional activities?

There is no organized effort to monitor post-graduate professional activities of the student although the department attempts to maintain a contact list for all of it’s graduates obtained informally by word of mouth with faculty advisors and colleagues. Most of the students request references from the faculty for job applications and this enables the department to track these students. Some of our MS students subsequently enter the MD program at
JABSOM or elsewhere. Some of our students are in academia, in industry or work with state or international health agencies. It is possible to monitor the contribution of our students in academia by following their research publications using publication search engines such as PubMed MEDLINE or interacting with them at the national meetings. Many international students continue to work in academic institutions as well as national health programs in their native countries.

Table 1. Recent Graduate Student Presentations and Abstracts.

<table>
<thead>
<tr>
<th>Student</th>
<th>Abstract Title and Meeting</th>
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<tbody>
<tr>
<td>McLinden, RJ</td>
<td>Comparison of HIV-specific neutralizing antibody to peripheral blood mononuclear cells (PMBC)-derived primary HIV isolates in PBMC and a CCR5+CD4+ T cell line, RCMI International Symposium on Health Disparities, Honolulu, HI, December, 2002.</td>
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<tr>
<td>Sasser, T</td>
<td>Exploring the potential of utilizing the yeast two-hybrid (Y2H) system as a means of detecting interactions between Plasmodium spp. merozoite surface protein-1 (MSP-1) and erythrocyte proteins. World Health Organization/TDR and MR-4 Workshop, “Workshop on Transfection of Malaria Parasites”, New Delhi, India, April, 2002.</td>
</tr>
<tr>
<td>Sasser, T</td>
<td>Merozoite Surface Protein. 27th Annual Achievement Awards Symposium, ARCS Foundation, Honolulu, HI, April, 2002.</td>
</tr>
<tr>
<td>Concepcion, JM</td>
<td>Frequency distribution of allelic polymorphisms in microsatellites associate with asthma and allergy in Asian and Pacific Islanders, American College of Chest Physicians, October, 2002.</td>
</tr>
<tr>
<td>Concepcion, JM</td>
<td>Kick Ash: an interactive smoking cessation program for the work site. Biomedical Sciences Symposium, Honolulu, HI, April, 2000.</td>
</tr>
<tr>
<td>Isami, F</td>
<td>Evolution of HIV-1 subtype CRF_AE in Vietnam and neighboring Southeast Asian countries. 8th RCMI International Symposium on Health Disparities, Honolulu, HI, December, 2002.</td>
</tr>
<tr>
<td>Isami, F</td>
<td>Multi-clade HIV infection among returning overseas contract workers from Pakistan. 8th RCMI International Symposium on Health Disparities, Honolulu, HI, December, 2002.</td>
</tr>
<tr>
<td>Bishop, D</td>
<td>West Nile virus nonstructural NS4B protein induces endoplasmic reticulum stress response through interaction with activating transcription factors. Biomedical Sciences Symposium, Honolulu, HI, April, 2005.</td>
</tr>
</tbody>
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Co, J  
Mentors: V. Nerurkar/S. Bennett  
Molecular evolution of the NS5 polymerase gene of dengue virus 2 from Puerto Rico reveals high numbers of amino acid changes with the large 1994 outbreak. Biomedical Sciences Symposium, Honolulu, HI, April, 2005.

Co, J  
Mentor: V. Nerurkar  
Detection of West Nile virus RNA in the urine of a patient with encephalitis. Biomedical Sciences Symposium, Honolulu, HI, April, 2005.

Chapagain, M  
Mentor: V. Nerurkar  
Development of in vitro blood brain barrier model to study the pathogenesis of human polyomavirus JC. Biomedical Sciences Symposium, Honolulu, HI, April, 2005.

Abe, L  
Mentor: K. Yamaga  

Abe, L  
Mentor: K. Yamaga  
The adhesion properties of group A streptococci from patients with acute rheumatic fever in Hawaii. 23rd Infectious Disease Society of America meeting, Chicago, IL, October, 2002.

Abe, L  
Mentor: K. Yamaga  
The adhesion properties of group A streptococci from patients with acute rheumatic fever in Hawaii. 8th Research Centers in Minority Institutions International Symposium on Health Disparities, Honolulu, HI, December, 2002.

Abe, L  
Mentor: K. Yamaga  
Characterization of Group A Streptococci isolates from an outbreak of necrotizing fasciitis in Maui, Hawaii. 8th Research Centers in Minority Institutions International Symposium on Health Disparities, Honolulu, HI, December, 2002.

Tanabe, B  
Mentor: K. Yamaga  
Risk factors associated with rheumatic heart disease. 8th Research Centers in Minority Institutions International Symposium on Health Disparities, Honolulu, HI, December, 2002.

Abe, L  
Mentor: K. Yamaga  

Abe, L  
Mentor: K. Yamaga  
Comparison between an invasive and non-invasive isolate of Streptococcus pyogenes obtained from the same patient. ASM Conference on Functional Genomics and Bioinformatics Approaches to Infectious Disease Research, Portland, OR, October, 2004.

Garcia, A  
Mentor: K. Yamaga  
Expression of streptococcal pyogenic exotoxin B in two temporally different Streptococcus pyogenes isolates from a single patient. Biomedical Sciences Symposium, Honolulu, HI, April, 2005.

Table 2. Recent Graduate Student Co-authored Publications in Peer-Reviewed Journals (graduate student authors indicated in bold font).


Tanabe BK, Abe LM, Kimura LH, Reinker KA, Yamaga KM. Cytokine mRNA repertoire of
articul chondrocytes from arthritic patients, infants, and neonatal mice. Rheumatol Int. 1996;16(2):67-76.


