TROPICAL MEDICINE (TRMD)

TRMD 6010 Biological Basis of Disease (3)
This course provides a foundation of knowledge about the human body in health and disease. It gives an overview of important concepts of the biological mechanisms of disease at the cellular, individual, and societal levels. At the cellular level, the course summarized DNA and cellular function, genomics, immunology, and vaccination. At the individual and societal levels, the course addresses the most important infectious and non-infectious causes of death worldwide, providing background on their pathophysiology, clinical aspects, and patterns of disease occurrence, risk factors, and methods of prevention.

TRMD 6040 Early Introduction to Laboratory Research in Tropical Medicine (0)
This introductory course serves to introduce new students to foundational concepts and methods in laboratory research, including the regulatory and applied aspects of laboratory based research. Assigned to a faculty supervisor and shadowing laboratory personnel during day-to-day laboratory activities, students will gain a firsthand practical experience. Additionally, students will gain the theoretical aspects from various activities, including presentations, article readings, and in-class discussions.

TRMD 6050 Medical Helminthology (3)
Medical Helminthology is the study of worm (helminth) parasites of medical significance to humans. In this course, we will discuss the helminths which cause human disease in terms of geographic distribution, transmission, clinical presentation and pathology, diagnosis, treatment, and control strategies. Emphasis will be placed on the helminths which affect large populations of humans and on those which are emerging pathogens. Clinicians will receive a strong grounding in diagnosis and treatment of diseases due to helminths, and public health professionals will appreciate how to apply and evaluate different methods of prevention and control on a population basis.

TRMD 6060 Medical Entomology (3)
This course is designed to provide the fundamental information necessary for understanding and evaluating both the role of arthropods in transmission of pathogens causing human disease, and the role of arthropods in directly causing human disease. Following a brief overview of the general anatomy, physiology, and classification of arthropods, individual groups of medical importance are considered in detail with regard to the recognition of important species, the epidemiology and pathogenesis of associated diseases, and the principles and methods of vector control.

TRMD 6070 Medical Protozoology and Malaria (3)
The identification of medically important parasites relies heavily upon macroscopic and microscopic examination of clinical specimens. In this course students will learn the basic principles of identifying parasitic helminthes and protozoa in blood, feces, and tissue specimens. Prepared specimens of the major helminth and protozoan pathogens of humans will be provided for macroscopic and microscopic examination. Students will learn the basic operations of the microscope and how to identify and distinguish the various helminthes and protozoa. Samples demonstrating the pathological features of the disease will also be provided. The techniques for preparing diagnostic specimens of parasites in blood and feces will be reviewed. In the laboratory students will learn the basic principles of identifying parasitic protozoa in blood, feces, and tissue specimens. Students will learn the basic operations of the microscope and how to identify and distinguish the various protozoa. The techniques for preparing diagnostic specimens of parasites in blood and feces will be reviewed.

TRMD 6080 Medical Protozoology Lab (1)
This course provides students with training in the use of a microscope and the identification of medically important protozoa in fecal, blood, tissue and other specimens. Laboratory exercises will focus upon the detection and recognition of parasitic protozoa in prepared samples. Students will learn how to distinguish the various protozoa which infect humans and be able to identify protozoa in clinical and histological preparations.

Prerequisite(s): TRMD 6070.

TRMD 6090 Parasitology Laboratory (1)
The identification of medically important parasites relies heavily upon macroscopic and microscopic examination of clinical specimens. In this course students will learn the basic principles of identifying parasitic helminthes and protozoa in blood, feces, and tissue specimens. Prepared specimens of the major helminth and protozoan pathogens of humans will be provided for macroscopic and microscopic examination. Students will learn the basic operations of the microscope and how to identify and distinguish the various helminthes and protozoa. Samples demonstrating the pathological features of the disease will also be provided. The techniques for preparing diagnostic specimens of parasites in blood and feces will be reviewed.

TRMD 6100 Health and Human Rights (1)
This course is designed to provide a forum for discussion of pertinent issues in global health and human rights and to motivate students to become active advocates for their resolution. Students will participate in weekly discussions with local and national experts in public health, clinical medicine, and health sciences research who are also strong advocates for human rights. The speakers will stress the importance of addressing the underlying social, political, and economic factors influencing health. Speakers will give examples from their background and the motivations for their career choices and discuss the skills and strategies necessary to become effective advocates for health and human rights.

TRMD 6150 Ethics in International Health (3)
This interdisciplinary course provides a foundation for assessing the ethical impact of public health practice and research in international contexts. Unlike bioethics or medical ethics, which focuses on individual decision-making, this course addresses population-level ethical challenges that span across borders. The course is structured around three key areas: research ethics, ethics in policy development, and ethics at the ground level. A variety of pressing topics such as vaccinations, climate health, and artificial intelligence will be used to stimulate discussions and highlight international ethical debates. By end of the course, students will be equipped with an ethical framework that can be adapted to their future roles, whether in international organizations like WHO, as researchers, or in ground-level work with NGOs, preparing them to navigate the ethical complexities of decision-making in international health.

TRMD 6170 Immunology (3)
This course is designed for students of public health and the basic biomedical sciences who are interested in a current overview of immunology. This course is a comprehensive introduction to immunity and immunopathogenesis as it relates to health and disease. Following a thorough consideration of cells and tissues of the immune system, attention is given to immune recognition and regulation of immune responses, with special emphasis on the role of cytokines in immunity. Finally, clinical concepts are presented with current knowledge of basic immune mechanisms for each: autoimmunity and autoimmune disease, transplant rejection, immunity to tumors, primary immunodeficiency diseases, and immunity to infectious agents including viruses and parasites, and immunopathogenesis of HIV/AIDS.

TRMD 6200 Impact Evaluation in Global Health (3)
This course introduces students to the basic concepts, principles, and practices for public health programs and interventions. It focuses on impact evaluation at the national and sub-national levels, in addition to community and intervention-based evaluations. Lectures, discussions, and assignments will highlight evaluation strategies for health programs and disease-specific prevention and control interventions in international settings with a focus on diseases and programs in the tropics. The course is intended to 1) introduce students to impact evaluation, 2) provide a solid grounding in study designs relevant in field settings; 3) develop students' skills in designing evaluation plans, and 4) serve as a foundation for more specialized program evaluation classes as well as for courses on data analysis, sampling, epidemiology, and operations research. This course is not intended for those students who already have taken GCHB 6200 or GCHB 6340.

TRMD 6250 Biomedical Research Methods (3)
Students will be able to apply the basic biomedical methods used in public health and tropical medicine research or practice, and summarize the principle and the theoretical basis. They will be able to analyze the strengths and weaknesses of the different methods, and design hypothesis-driven studies to address public health and tropical medicine problems, applying the appropriate methods. Students will also assess scientific papers and critically appraise their relative merit in the field of public health research and practice.

TRMD 6330 Microbial Disease of the Tropics (3)
This required course builds foundational knowledge regarding the important bacterial and mycotic (fungal) pathogens in the tropics. This course forms a part of the foundations of tropical medicine knowledge. Students will learn the etiology, epidemiology, transmission characteristics, pathogenesis, clinical features, diagnosis and management of diseases caused by these pathogens. This course draws on faculty expertise both within Tulane and outside. The course focuses on disease topics not usually covered in depth in the US medical or public health curriculum. Additionally, the content of this course is a required component of the syllabus for the American Society of Tropical Medicine & Hygiene's CTropMed certification examination.

TRMD 6340 Diagnostic Methods in Microbiology (3)
Medical laboratory science professionals play a crucial role in healthcare by excelling in specimen collection, processing, and analysis, conducting laboratory procedures, maintaining instruments, and applying findings to disease diagnosis, treatment, and prevention. This course introduces students to the field of Medical Laboratory Science through a blend of lectures and hands-on practical sessions. Here, students develop professionalism, interpersonal skills, and proficiency in laboratory techniques such as solution preparation, aseptic techniques, and equipment handling.

TRMD 6420 Tropical Virology (3)
This course covers the broad area of virology with an emphasis on viruses of public health concern in developing and tropical countries. Both historically problematic and emerging viruses are covered. Topics include the molecular biology, epidemiology, and pathology of selected viruses. Focus is placed on developing an understanding of the molecular aspects of the viral life cycle that give rise to transmission and pathogenic characteristics, especially in the context of the co-evolution of the virus and host. Additional topics include the interactions between the virus and host immune response, as well as viral control and the development of vaccines and anti-viral pharmaceuticals. Students enrolled in the course should come with a basic understanding of communicable disease concepts.

TRMD 6760 From Theory to Practice: Public Health Field Skills in Peru (3)
This course translates public health concepts into practical field skills applied in an international setting in Peru. Students will learn GPS mapping and geospatial analysis using GIS, environmental health risk assessment, household survey design, and conduct a mock epidemiological investigation and outbreak response. Emphasis will be placed on addressing ethical challenges in global health and exploring social determinants of health. Students will choose between a three-day focus on (1) trapping and identifying arthropod vectors and small mammals and their associated pathogens or (2) implementation science and community engagement strategies. Fieldwork will take place in two distinct regions of Peru: the Amazon rainforest basin (Iquitos) and the coastal capital city (Lima), providing diverse perspectives on public health challenges.

TRMD 7000 Tropical Medicine Seminar (1)
Tropical Medicine Seminar is designed as a journal club, with the specific goal of training students to develop skills in critically evaluating and effectively presenting relevant scientific literature. Each student is expected to present at least one article to the class from recent tropical medicine literature, and to attend and actively participate during presentation delivered by other students. Course may be repeated up to unlimited credit hours.

Maximum Hours: 2

TRMD 7020 Infectious Disease Seminar (0-1)
The seminar experience is intended to stimulate a critical reading of the current literature and to ensure that each student learns to present important and potentially controversial data in a rigorous and careful fashion.

Maximum Hours: 99

TRMD 7180 Immunoparasitology (3)
Unicellular and multicellular parasites are responsible for billions of people being affected worldwide. Their complex life cycle in the mammalian host, intermediate hosts in some cases and the insect vectors that transmit them, make the process of controlling these infections a real challenge. Basic biological and genomic advances continue to identify novel targets for innovative ways to rationally design drugs and vaccines. Parasites have also evolved unique ways to either exploit the immune system or evade immune responses for their survival.

TRMD 7300 Mechanisms of Pathogen Intervention (2)
This course provides an advanced foundation of knowledge about the selection and mechanisms of action of different interventions against important viruses, bacteria and unicellular parasites of public health significance. The course describes how drugs, vaccines and other intervention agents reach their cellular targets and how they act in harmony with the host immune system to control or eradicate the pathogen, inside the human or the arthropod hosts.

Prerequisite(s): TRMD 6170.

TRMD 7330 Advanced Topics in Host Pathogens (2)
This course will provide both an overview and an update on the recent advances in the study of host-pathogen interaction at the cellular and molecular levels. The focus will be on pathogen molecules that mediate interactions with host (and vector, if applicable), and the role these interactions play in host recognition and modulation, pathogen survival, virulence, and disease progression. The course will cover topics such as host specificity, immune evasion, pathogenicity and host-pathogen coevolution. Examples from the current literature will illustrate the link between basic science research in infectious diseases and our understanding of broader biological phenomena, as well as mechanisms of pathogenesis.

Prerequisite(s): TRMD 6170, 6070 and 6330.

TRMD 7350 Disease Control in Low Resource Settings (3)
This course focuses on the control of diseases in low resource settings as seen in several low- and middle-income countries (LMICs). Starting with general concepts and strategies including provision of basic preventive services such as vaccination programs and universal health coverage, the course advances to examine major disease conditions including both communicable diseases and non-communicable diseases. Disease control in special populations such as child health, maternal heath, and migrant health are included. Students gain skills by analyzing an actual outbreak, synthesizing response information and creating recommendations for future outbreaks. The seminar portion enables students to analyze and critique original articles that study the impact of a public health intervention. Skills essential to the global health practitioner are emphasized.

TRMD 7420 Population-Based Malaria Prevention and Control (3)
This course introduces the principles of prevention and control of malaria infection and disease, as well as population based methods for evaluating the success of control programs or new interventions. This course investigates how culture, society, and the environment influence disease transmission, risk factors, and health status. Students will analyze data and integrate information using a monitoring and evaluation framework to inform prevention and control policy. Topics covered will include vector ecology, malaria epidemiology, malaria control strategies, malaria monitoring and evaluation, issues around cost-effectiveness, and prospects for elimination.

Prerequisite(s): (EPID 6030, SPHL 6860 or 6060).

TRMD 7450 Tuberculosis: Global Trends, Challenges, and Opportunities (3)
This course is a comprehensive overview of tuberculosis comprising a series of interactive lectures, discussions, case studies, and a major skills-building assignment in the form of a symposium proposal submission to the international TB conference. Starting with basic concepts of tuberculosis infection/disease, diagnosis, clinical manifestations, and management, the course advances to epidemiology and control including challenges posed by co-morbidities (HIV, Diabetes, COVID-19) and special issues such as Multidrug Resistance, Indigenous populations, Migrant issues, Disaster/ Conflict situations. Social aspects of tuberculosis are a recurring theme throughout the course. The most important programmatic perspectives that address these issues are included. Guest faculty are well-known experts who bring extensive experience to the course. An optional field visit to the Wetmore Tuberculosis Clinic is offered.

TRMD 7500 Advanced Tropical Virology (2)
This course covers advanced topics in tropical virology. The focus is on viruses of recent public health concern in developing and tropical countries. Both historically problematic and emerging viruses are covered. Topics from published literature include molecular biology, epidemiology and pathology. Emphasis is placed on extending and deepening the understanding of the molecular aspects of the viral replication that gives rise to transmission and pathogenic characteristics. Additional topics include the interactions between the virus and host immune response, as well as viral control and the development of vaccines and anti-viral pharmaceuticals.

Prerequisite(s): TRMD 6420.

TRMD 7650 One Health Approaches to Disease (3)
One Health is a framework to expand interdisciplinary collaborations and communications for optimal health of people, domestic animals, wildlife, plants and our environment. This course will explore the theory behind One Health, describe methods and tools used in One Health, and develop skills to work with interdisciplinary teams and communication across professions. Using a One Health framework, we will discuss case studies of emergent health issues including emerging diseases, antibiotic resistance, food safety and security, climate change, and disease surveillance. Students will work in teams to produce an analysis of a health issue using a One Health framework.

Prerequisite(s): (SPHL 6020, 6820 or minimum score of PASS in 'SPHL 6020 Exemption') and (SPHL 6060 or 6860) and (SPHL 6070 or 6870) and (SPHL 6080 or 6880).

TRMD 7800 Advanced Medical Entomology (3)
This advanced course applies the most current knowledge in vector biology to the study of arthropods and diseases they transmit. It meets twice a week: a 2hr30´ classroom session (a lecture and in-class activities) followed by a 2h30´ lab session, in which students reinforce classroom learnings with practical experience in performing bioassays; bioinformatic, ecological, behavioral and surveillance experiments; computer and video simulations, and metabolomics. Drawing from current, primary literature and discipline-specific guidelines, students also write and present a research proposal on a topic of interest. Primary and guest instructors, which include vector biologists and biochemists from local, regional and national institutions, reflect diverse identities. This unique structure makes the course well-suited for anyone interested in vector-borne research and disease control.

Prerequisite(s): TRMD 6060*.
* May be taken concurrently.

TRMD 7820 Malaria (2)
This is an advanced course which provides a rigorous approach to both the basic and applied issues related to malaria and malaria control. Areas covered in detail include cell biology and biochemistry of the parasite-red cell integration, antimalarial drug action and resistance mechanisms, parasite genetics and cell biology and the immunologic aspects of malaria, including asexual and sexual stage candidate vaccine antigens. At the conclusion of the semester, students are expected to critically review current malaria control and research strategies and to suggest and defend appropriate alternatives.

TRMD 7900 Antimicrobial Resistance (3)
This course provides an in-depth exploration of antimicrobial resistance (AMR) and its impact on global health. Students will examine the mechanisms, epidemiology, and consequences of AMR, as well as strategies for combating this pressing public health issue. The course will cover interdisciplinary perspectives, including microbiology, pharmacology, public health, policy, and ethics, to foster a comprehensive understanding of AMR and its multifaceted challenges. Through case studies and discussions, students will develop the knowledge and skills necessary to contribute to the prevention and control of AMR.

Prerequisite(s): SPHL 6060.

TRMD 7960 Clinical Tropical Medicine (3)
Clinical Tropical Medicine is designed to offer an overview of topics of clinical importance in tropical medicine, with an emphasis on a syndromic approach to patient presentation. Through a combination of lectures and clinical case presentations with group discussions the course both introduces key subject matter and will help students apply their knowledge to the clinical sphere. It is expected to complement other course offerings from the Tropical Medicine Department for the MPHTM and Diploma in Tropical Medicine curricula. Participants should have some experience in clinical medicine (usually a terminal degree in medicine, nursing, or veterinary sciences) and should either have experience or be in the process of learning about diseases of the tropics.

TRMD 7990 Special Studies (1-3)
Masters students and advisor select a topic for independent study and develop learning objectives and the expected written final product.

TRMD 8080 Large Dataset Management and Sequencing: Part 1 (3)
TRMD 8080 and 8090 are interdependent courses designed to develop skills in generating hypotheses specific to DNA sequence data, applying protocols for sample collection, analysis of large data sets, use of the MinION instrument and presentation of research findings that demonstrate rigor and reproducibility. TRMD 8080 (fall semester) introduces students to the principles and theoretical bases of novel molecular methods, design studies and hypotheses to be addressed. Students learn to collect sequence data using an accessible sequencing instrument. TRMD 8090 (spring semester), equips students with techniques for evaluating and analyzing large data sets, with attention to rigor and reproducibility. The experience of these courses will be broadly applicable, regardless of the area of public health pursued.

TRMD 8090 Large Dataset Management and Sequencing: Part 2 (3)
TRMD 8080 and 8090 are interdependent courses designed to develop skills in generating hypotheses specific to DNA sequence data, applying protocols for sample collection, analysis of large data sets, use of the MinION instrument and presentation of research findings that demonstrate rigor and reproducibility. TRMD 8080 (fall semester) introduces students to the principles and theoretical bases of novel molecular methods, design studies and hypotheses to be addressed. Students learn to collect sequence data using an accessible sequencing instrument. TRMD 8090 (spring semester), equips students with techniques for evaluating and analyzing large data sets, with attention to rigor and reproducibility. The experience of these courses will be broadly applicable, regardless of the area of public health pursued.

TRMD 8100 Laboratory Rotation (2)
Doctoral students are required to take TRMD 8100 Laboratory Training three times in different DTM faculty laboratories for a total of six credits (2 each). The faculty member will be identified on the student's transcript as the person teaching the course. At the completion of each lab rotation, the advisor will fill out a lab rotation form and assign a pass/fail grade. In addition to a record of grade on the student's transcript, this report will be maintained in the student's file by the department. Before enrolling in the TRMD 8100 course, students are encouraged to meet with various faculty members and discuss the prospect of doing a rotation with them. The rotations will acquaint the student with the different research programs available in the department and assist the student in choosing a permanent dissertation advisor. In addition, by rotating through several laboratories the student will obtain laboratory experience and training in specialized areas. Ideally the laboratory rotations should begin during the first semester and continue through the summer until a permanent advisor is chosen in the second year.

Course Limit: 3

TRMD 8990 Doctoral Independent Study (1-3)
Doctoral students and advisor select a topic for independent study and develop learning objectives and the expected final written product.

Maximum Hours: 99

TRMD 9980 Master's Thesis Research (0)
MS students engaging in thesis research.

Course Limit: 3