DEPARTMENT OF TROPICAL MEDICINE

Programs
Chair: Ronald Blanton, MD, MS

William G Vincent Professor of Tropical Medicine

Mission
The Department of Tropical Medicine conducts basic and applied research in the fields of tropical medicine, parasitology and applied population-based malaria evaluation research and educates students to address the clinical, laboratory and evidence-based approaches to prevent and control tropical diseases.

About TRMD
The Department of Tropical Medicine (TRMD) has long and prestigious history as one of the oldest institutions studying, preventing and managing topical diseases. A leader in the field, TRMD has a strong international reputation for research and education in vector-borne and other tropical infectious diseases. TRMD addresses tropical diseases from the clinical, laboratory and epidemiological approaches.

The degree programs educate students in field work, epidemiology and evidence-based prevention and control, along with state-of-the-art laboratory studies of tropical diseases. Graduates are prepared to work in disease control programs, diagnostic parasitology labs, and academic and research laboratories.

Department faculty have extensive expertise in areas such as mosquito biology and biochemistry, medical and biochemical entomology, tropical virology, and population-based prevention and evaluation. They conduct basic and applied research on vector-borne infectious diseases like Chagas, Dengue fever, West Nile virus, Lassa fever, and Ebola virus.

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Graduate Certificates
• Clinical Tropical Medicine Certificate (Graduate) (https://catalog.tulane.edu/public-health-tropical-medicine/tropical-medicine/tropical-medicine-certificate/)
• Methods in Monitoring and Evaluation Certificate (Graduate) (https://catalog.tulane.edu/public-health-tropical-medicine/tropical-medicine/methods-monitoring-evaluation-certificate/)

Graduate
• Public Health and Tropical Medicine, MPHTM (https://catalog.tulane.edu/public-health-tropical-medicine/tropical-medicine/public-health-tropical-medicine-mphtm/)
• Tropical Medicine, MS (https://catalog.tulane.edu/public-health-tropical-medicine/tropical-medicine/tropical-medicine-msp/)
• Tropical Medicine, PhD (https://catalog.tulane.edu/public-health-tropical-medicine/tropical-medicine/tropical-medicine-phd/)

Courses
Tropical Medicine (TRMD)

TRMD 6010 Biol 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 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. In the laboratory students will integrate what they learn in lecture with identification of the parasite. They will research intriguing clinical vignettes and use the laboratory to discover the answer. Students will learn the basic principles of identifying parasitic helminths in blood, feces, and tissue specimens.
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 (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)
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 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 GH (3)
This course provides students with basic concepts, principles, and practices for the evaluation of public health programs and interventions. 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.

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 Trp (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 Meth/Microbio (2)
This laboratory course parallels topics presented in TRMD 6330. The course is designed to teach students how to perform basic laboratory tests using simple techniques applicable to developing countries. Most of these will be diagnostic tests for infectious diseases, although some clinically relevant non-diagnostic techniques will also be taught (e.g., complete blood counts). The bulk of the course consists of hands-on laboratory experience conducting laboratory tests with clinical specimens and analyzing prepared teaching specimens. Procedures for organism isolation and identification and rapid diagnostic kits will be covered.

TRMD 6350  Disease Prevention & Control in Developing Countries (2)
This course is designed for students enrolled in the diploma in tropical medicine and traveler’s health program to prepare them to recognize and contribute effectively to the public health needs of communities in developing countries. The course focuses on disease prevention and control strategies with special reference to developing countries; assessment of community needs, and provision of basic preventive services; control of important endemic diseases such as malaria, tuberculosis, and HIV/AIDS; and other topics such as outbreak investigation, emerging infectious diseases, immunization programs, and disease eradication programs.

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 6450  Tb Global Trends & Inter (2)
Students, faculty and visiting professors will present clinical cases pertaining to issues in tropical medicine, wilderness medicine and travel medicine. There will be active class participation.

TRMD 7000  Tropical Medicine Semin (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: 99

TRMD 7020  Infectious Disease Seminar (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 (2)
Prerequisite(s): TRMD 6170.

TRMD 7300  Mchanisms of Phogen Intrventn (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 Pathog (2)
Prerequisite(s): TRMD 6170, 6070 and 6330.

TRMD 7420  Pop Bsed Malaria Prev and Ctrl (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 or SPHL 6060).

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**TRMD 7440** Household Sampling Apps in Developing (3)
The use of scientific household surveys to obtain population-level data for research and program-related needs in developing countries without adequate health information systems has become increasingly common in the international health, population and nutrition sectors. This is attested to by the proliferation of standardized survey protocols in these sectors. In order to take full advantage of recent developments in survey methodologies, professionals working in these sectors need to have a solid understanding of the intended uses and limitations of various standard sampling protocols, as well as the underlying principles of survey measurement. Prerequisite(s): (BIOS 6030* or SPHL 6050* or EPID 6030* or SPHL 6060*). * May be taken concurrently.

**Prerequisite(s):** (BIOS 6030* or SPHL 6050* or EPID 6030* or SPHL 6060*).

**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 or 6420).

**Prerequisite(s):** (TRMD 6420 or 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): EPID 6030 and ENHS 6030.

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**TRMD 7800** Adv Medical Entomology (2)
This is an advanced course that challenges students to consider basic principles in medical entomology relating to the ecology, epidemiology, and control of pathogen transmission. Lectures and corresponding laboratories cover topics such as vector behavior, physiology, genetics, immune response, molecular biology, vector-pathogen interaction and vector-borne disease surveillance and diagnostics. This material provides a foundation for understanding vector ecology and the dynamics of pathogen transmission. Students will learn how current research in medical entomology offers new prospects for the control of vector-borne diseases. They will also learn about and work through the process of grant preparation and submission to obtain funding for vector-borne disease research. Prerequisite(s): TRMD 6060.

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**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 7860** Clinical Case Presentations (1)
Students, faculty and visiting professors will present clinical cases pertaining to issues in tropical medicine, wilderness medicine and travel medicine. There will be active class participation.

**TRMD 7960** Clinical Trop 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. Students, faculty and visiting professors will present clinical cases pertaining to issues in tropical medicine, wilderness medicine and travel medicine. There will be active class participation.

**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  Advanced Methods in Molecular Epidemiology (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 is taken in the fall semester and 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. The experience of these courses will be broadly applicable, regardless of the area of public health pursued.

TRMD 8090  Advanced Methods in Molecular Epidemiology (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 8090, taken in the spring, 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)
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.

TRMD 9970  Dissertation (0)
Doctoral candidates who have defended their prospectus and are engaged in research. Course may be repeated up to unlimited credit hours.

Maximum Hours: 99

TRMD 9980  Master's Thesis Research (0)
MS students engaging in thesis research. Course may be repeated up to unlimited credit hours.

Maximum Hours: 99

TRMD 9990  Dissertation Research (2)
Doctoral students who have completed course work but not defended their prospectus. Course may be repeated up to unlimited credit hours.

Maximum Hours: 99