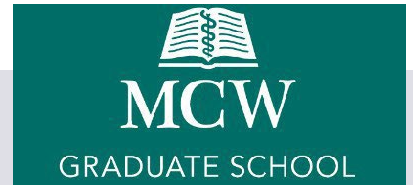


2026-27

CLINICAL & TRANSLATIONAL SCIENCE

Degree Offered: Certificate



Program Description

The CTSI offers three (3) Graduate Certificates in addition to the Master's in Clinical and Translational Science. The certificate program is designed for individuals who want additional training but may not want to pursue a full master's degree and for those who have already completed professional clinical training but would like additional training in clinical and translational research.

Certificate students are required to select from one of three emphasis tracks. Typically, students will take 2 courses in the Fall and 2 courses in the Spring. The certificate is designed to be completed within one (1) academic year, and students have up to two (2) calendar years to complete all requirements. The courses identified for each emphasis track are below.

Students completing the Certificate will also be able to transfer their 12 credits into the Master's in CTS degree. Students wishing to take this route will need to apply to the Master's program prior to the application deadline and would be able to begin in the fall of the following academic year.

Admission Requirements

In addition to the general [Graduate School admission requirements](#), this program has an additional specific requirement.

Potential students must apply by July 1st for Fall term enrollment.

Fields of Study

Certificate students will select from one the four tracks and complete 4 classes, or 12 credits. The emphasis tracks include Translational Science, Population Science, and Health Systems Science.

Translational Science

This track is focused on the foundational principles of the translational process. This "bench-to-bedside" process involves moving discoveries from their basic foundation to clinical settings. Discoveries of focus include diagnostics, therapeutics, medical procedures, and other interventions. Suggested electives for this program include Translational Genomics and Survey of Biomedical Engineering.

Population Science

There are a variety of factors that can influence health outcomes at a population level, and this track will focus on the relationship between these factors, health, and research. This program will focus on factors such as socioeconomic status, health disparities, social determinants of health, healthcare systems, environment, and policies. Suggested electives

include Health Economics, Introduction to Statistics using Stata, Regression using Stata, and Health and Medical Geography.

Health System Science

The focus of this track is on principles and processes within the healthcare system. The topics of focus will include delivery of healthcare, how healthcare professionals work together, and improvements that can be made within the system to improve healthcare delivery. Suggested electives for this program include Health Economics, Health and Medical Geography, Dissemination and Implementation Science, and Qualitative and Mixed Methods.

Credits Required to Graduate

12 credits

Required Core Courses

20101 Introduction to Clinical and Translational Science. 3 credits.

The goal of this course is to help students understand the foundations of translational science, develop an understanding of the benefits and difficulties associated with translational research, and to understand and evaluate the role of interdisciplinary and team science in translational research. Coursework will include weekly reading of peer-reviewed manuscripts, assignments, and a final project. Weekly classes will include discussion of reading and assignments are designed to allow practice of critically reading and planning translational science projects. The course will meet once per week for a total of 18 weeks.

20220 Clinical Statistics I. 3 credits.

This is an introductory course in evidence discovery that demonstrates the concepts and application of statistical techniques/tools, given the role of statistics as an information science. The course is intended to inform and provide quantitative skills for graduate students interested in undertaking research in clinical medicine, epidemiology, public health, translational and biomedical sciences. This course emphasizes the basic dogma of statistics namely the central tendency theorem as well as sampling as the core of statistics. With the characterization of statistics as descriptive and inferential, the descriptive arm of statistics is stressed in this course namely summary statistics. Basic probability concepts are covered to stress the importance of sampling prior to reliable inference from the sample data. Sample estimation of the population and the precision (confidence interval) are described as well as the hypothesis testing notion in inferential statistics. The parametric and non-parametric methods are introduced with the intent to describe the methods as applicable to continuous (ratio, interval, cardinal) and discrete (categorical binary, dichotomous) data.

20160 Foundations in Health Services Research. 3 credits.

The course will provide the student with a broad understanding of health services research design and methodology, as well as provide the student with the opportunity to engage in a mentored, individualized, in-depth study experience. By the end of the course the student will be able to understand key theories that serve as the foundation of health services research and understand the process of developing a research idea and translating it into an R-series level NIH proposal. Coursework will include weekly reading of peer-reviewed manuscripts, one introductory textbook on health services research, and one introductory textbook on designing clinical research. Weekly classes will include discussion of reading and assignments are designed to allow practice of critically reading and planning health services research projects.

Elective Courses

20253 Methods in Grant Preparation

Emphasis Track(s) suggested for: Population Science, Health Systems Science, Translational Science

The purpose and goal of this course is to present advanced principles of National Institutes of Health (NIH) Grant preparation. Topics to be covered will include: Writing with a purpose and intent; writing statements of innovation and significance; research design; and translational research. The course will also address how to succinctly state overall and specific hypotheses and specific aims with affirmation and relevance. The course will suggest specific writing styles with the intent of clearly stating the importance of the specific aims, and bringing them to fruition and purpose. Special attention will be placed on how to write in a manner which presents proposal aims in an important and timely manner. The course will stress writing styles which relate distinct importance and purpose in a manner which relates novelty in the experimental design. Most of the course will cover the 12 page RO1 application. However, some time will also be devoted to other specific types of awards (i.e., mentored K awards, training grants, and programmatic initiatives). This course is recommended for individuals who have already located funding resources and are currently working on one or more grant proposals.

20241 Translational Genomics. 3 credits.

Emphasis Track(s) suggested for: Translational Science

The primary goal of this course is to teach students how to develop a research program to ask relevant genetic questions in the clinical setting utilizing the molecular genetics toolbox. To this end, students will be provided with background in molecular genetics strategies and study designs as well as an understanding of common genetics questions emanating from the clinic so that they will be better able to make connections between bench and bedside. In addition, they will be challenged to think creatively and through a translational focus during course-long case studies and group projects.

20120 Introduction to Health Disparities Research. 3 credits.

Emphasis Track(s) suggested for: Population Science, Health Systems Science

The course is an introduction to health disparities. By the end of the course, the student will be able to understand the relationship between inequities in social determinants of health and health outcomes in various populations. Coursework will include weekly readings from one textbook on multicultural medicine and health disparities as well as peer-reviewed articles to demonstrate the concepts in real-world experiences. Weekly classes will include discussion of the readings. Course projects will be assigned and are designed to allow practice of critically reading and appraising the literature related to applied health disparities research and also to understand the theoretical bases for health equity research.

20260 Introduction to Dissemination and Implementation Science. 3 credits.

Emphasis Track(s) suggested for: Health Systems Science, Population Science

The course is an introduction to dissemination and implementation and science research methods both theoretical and applied. By the end of the course the student will be able to understand the science of dissemination and implementation and applied methods for dissemination and implementation. Coursework will include weekly reading of peer-reviewed manuscripts and one introductory textbook on dissemination and implementation science. Weekly classes will include discussion of reading and course projects are designed to allow practice of critically reading and planning implementation research.

19210 Health and Medical Geography. 3 credits.

Emphasis Track(s) suggested for: Population Science, Health Systems Science

Geography and physical and social environments have important implications for human health and health care. This course will explore the intersections among geography, environments, and public health, with an emphasis on geographical analysis approaches for health data, to address two key questions: (1) How can concepts from geography help us to better understand health and well-being? (2) How can geographic tools, such as Geographic Information Systems (GIS) be used to address pressing questions in health and medical research?

19225 Introduction to Statistics Analysis. 3 credits.

Emphasis Track(s) suggested for: Population Science, Health Systems Science

This course will introduce fundamental statistical concepts, reasoning and methods that can be used for exploring, describing, and analyzing quantitative datasets. Students will become acquainted with basic statistical concepts, cleaning and organizing datasets, performing descriptive analysis and statistical reasoning, and interpreting results of univariate and bivariate analyses, hypothesis testing, and linear regression. By the end of the course, students will be able to analyze data independently using statistical software and interpret results. Coursework will include weekly reading, in-class data analyses, quizzes, two exams, and a focused course project. Course projects will enable students to independently develop research questions, acquire appropriate datasets, develop their skills in coding with data analysis software, complete statistical analyses, and interpret results.

19226 Applied Regression Analysis. 3 credits.

Emphasis Track(s) suggested for: Population Science, Health Systems Science

Prerequisites: 19225 Introduction to Statistics using Stata

This course will provide an introduction to the foundation's regression through hands-on training in advanced regression techniques using Stata. Statistical analyses covered will include multiple linear regression, analysis of variance, logistic, polytomous, and ordinal logistic regression, and mixed models. Students will become acquainted with the basics of coding and interpreting results of regression analyses, as well as diagnostics to confirm correct model fit. By the end of the course students will be able to conduct regression analyses independently and interpret results. Coursework will include weekly reading, in-class Stata analyses, and completion of a focused course project developed throughout the semester. Course projects will allow students to develop their skill set independently coding in Stata to complete statistical analyses and interpreting results within the context of strengths and limitations of each test. The final project will also incorporate both literature review and developing a research question that can be analyzed using existing data.

42150 Biomedical and Clinical Informatics and Data Science. 3 credits.

Emphasis Track(s) suggested for: Translational Science

This course provides an overview of the many types of informatics approaches and data science techniques that are used in the realm of medicine and clinical practice. Clinical informatics is a field of medicine focused on transforming health care by analyzing, designing, implementing, and evaluating information and communication systems that enhance individual and population health outcomes, improve patient care, and strengthen the clinician-patient relationship. Bioinformatics is the field focused on how to process high-throughput data for deriving knowledge from it.

