# CLINICAL INVESTIGATION

Degree Types: MS

The Degree Program in Clinical Investigation is sponsored by the Northwestern University Clinical and Translational Sciences (NUCATS) institute.

This program is part-time and consists of evening courses **primarily for medical residents, fellows and junior faculty members who wish to receive formal training in clinical research**. Other medical professionals in the Chicago area may be eligible to enroll. All program participants are expected to be actively engaged in research with a mentor, preferably one at NU, who should have national funding—NIH, AHA, etc. MSCI courses are open to graduate students in other life sciences' programs at NU to explore the application of basic science concepts to medicine. Students can enter the program at the beginning of any of the four quarters.

The program provides rigorous education in quantitative and ethically sound methods for the design, implementation, analysis, and publication of clinical research studies. In addition to courses in clinical trials and grant writing, students take courses in biostatistics, epidemiology, translational research, and medical writing.

Our faculty, who engage in clinical research training and participate in course design and instruction, are drawn from various departments including medicine, pediatrics, psychiatry, pulmonary, and neurology.

***Additional resources:***

- Department website (https://www.nucats.northwestern.edu/education-and-career-development/investigator-development/MSCI/)
- Program handbook(s)

## Degree and Certificate Offered

- Clinical and Translational Research Certificate (https://catalogs.northwestern.edu/tgs/clinical-investigation/clinical-translational-research-cert/)
- Clinical Investigation MS (https://catalogs.northwestern.edu/tgs/clinical-investigation/clinical-investigation-ms/)

- Learning objective(s)/Students should be able to…
    - Design effective research studies and analyze results.
    - Write competitive grant proposals.
    - Interpret statistical information.
    - Complete data-driven, first-authored manuscripts.
    - Hone skills crucial to publishing in top-tiered medical journals.

## Clinical Investigation Courses

**MSCI 311-0 Clinical Research Design, Methods, and Grant Writing (1 Unit)**
This course presents students with a comprehensive survey of concepts vital to a career in clinical & translational science. The course will fill a void in the curriculum by functioning as foundation from which other MSCI courses will spring and afford students an opportunity to interface with basic clinical and translational concepts before delving into these subjects more granularly as they pursue the degree. Items that will be reviewed in more depth later such as reviewing study designs and recognizing the types of research problems that lend themselves to interventional study designs are approached here as a way of better preparing students for the challenges ahead.

**MSCI 321-1 Biostatistics for Clinical Investigators 1 (1 Unit)**
This is an introductory yet rigorous course that covers classic statistical inference and methods. Applications and interpretation of data are emphasized. Mathematical proofs and derivations are not covered; however, theory is addressed conceptually. Readings are intended to be theoretical. Lectures, homework and exams will focus on applying statistical procedures using SPSS and interpreting data. Due to time restrictions, only selected topics are covered. The use of SPSS is a course requirement.

**MSCI 322-0 Introduction to Epidemiology for Clinical Investigators (1 Unit)**
This course is an introduction to the field of epidemiology and its application. Epidemiology is the study of the distribution of disease and determinants of disease in human populations. The most commonly used study designs in epidemiology are observational rather than experimental. The course will introduce these study designs and basic analytic methods. Emphasis will be on the appropriate interpretation of epidemiologic evidence, including the attribution of causality when describing an exposure-disease relationship.

**MSCI 330-0 Electronic Health Record Data as a Foundation for Clinical Research (1 Unit)**
This course will introduce electronic health records as a data source, considerations for working with protected health information and integration of health record data with other data sources and will explore clinical and research applications of medical records and discuss methods and tools for data validation and analysis.

**MSCI 335-0 Clinical Trials (1 Unit)**
The goal of this course is to provide students with the skills to design, conduct, analyze, interpret, and report the rest of a clinical trial. Trials by definition are experimental and are used to determine whether a clinical intervention works.

**MSCI 350-0 Community Engagement in Action: Applications for Research and Practice (1 Unit)**
Clinical and translational investigation aspires to be patient-focused. That is to say including the patient perspective at all stages of research will improve the likelihood of clinical translation – the concept that discoveries will result in tangible improvements in health. Engaging community partners in projects that may affect them has become a key competency for clinical investigators, but it is not an organic process; it requires skills, knowledge, and education. This course will educate learners in our MSCI program on the principles of community engagement with the goal that it results in their ability to do more impactful research over the course of their careers.

**MSCI 421-0 Biostatistics for Clinical Investigators 2 (1 Unit)**
This course covers advanced modeling techniques for statistical inference. Applications and interpretation of data are emphasized. Mathematical proofs and derivations are not covered; however, theory is addressed conceptually. Lectures, homework and exams will focus on applying statistical procedures using SPSS and interpreting data. Due to time restrictions, only selected topics are covered. The use of SPSS is a course requirement.

**MSCI 440-0 Antiracist Strategies for Clinical and Translational Research (1 Unit)**
This course provides an overview of how racism, especially anti-Black racism, affects health and health care, focusing on avoiding scientific errors and perpetuation of inequities in the design and conduct of clinical and translational research.

**MSCI 445-0 Writing & Peer Reviewing for Publication for Clinical Investigators (1 Unit)**
This course represents a HANDS-ON experience that will review and discuss the steps involved in preparing, peer reviewing, and revising manuscripts for publication. Students are expected to prepare and hand in written work for each class and to attend and participate actively in class discussion. Advance reading and writing are essential for this course.

**MSCI 490-0 Independent Study (1 Unit)**
Permission of instructor and department required.

**MSCI 499-0 Research Project (2 Units)**
The MSCI Research Project serves as a capstone for the degree; students enroll at or near the end of their coursework and signifies the culmination of a project that they have been working on throughout their time in the program. This is not a traditional classroom course but follows an independent study approach. Research must be data-driven and of publishable quality: clinical case studies or IRB submissions are not acceptable.

**MSCI 514-0 MSCI Concurrent Clinical and Research Responsibilities (0 Unit)**
Elective course for students pursuing Clinical and Research Responsibilities outside direct classroom participation.