

Clinical and Translational Science

Department Website: <http://chess.uchicago.edu/CCTS>

The Committee on Clinical and Translational Science (CCTS) is a freestanding academic unit housed within the Biological Sciences Division. Our mission is to enhance multidisciplinary training in clinical and translational science at the University of Chicago. We seek to offer high-quality curriculum and mentorship to a new generation of researchers who will synthesize social and biological science to significantly advance medical science and practice.

With joint input from the Center for Health and the Social Sciences (<http://chess.bsd.uchicago.edu>) (CHeSS) and the Institute for Translational Medicine (<http://itm.uchicago.edu>), the CCTS mobilizes faculty from across the University to enhance course offerings in clinical and translational science. While most courses offered in CCTS are designed for graduate-level trainees, postdoctoral fellows, and junior faculty, there are also specific courses designed for undergraduate students interested in health and social sciences. For more information contact Kelsey Bogue, Committee Administrator, at kbogue@bsd.uchicago.edu.

Current areas of concentration include:

- Comparative Effectiveness Research
- Translational Informatics
- Health Services Research
- Quality and Safety
- Clinical Research
- Community-Based Research
- Global Health
- Pharmacogenomics

Below is a list of undergraduate courses that have been offered in the past. Refer to the CCTS section of the CHeSS website at <http://chess.uchicago.edu/CCTS> for current course offerings and prerequisites for each course.

Examples of Previously Offered Undergraduate Courses

CCTS 21003. Topics in Clinical Research. 100 Units.

This course provides an overview of clinical research subject matter from the history and ethics of clinical research to the types and practice of contemporary clinical research. How does clinical research differ from other research traditions? What is special about clinical research? What types of questions can be answered by clinical research (what questions not)? What types of ethical oversight over the responsible conduct of research have arisen over the years? We will learn how to read and critique clinical research, survey the major types of clinical research designs, and the differences between hypothesis generation and hypothesis testing. Finally, we provide an overview of the mechanics of developing and implementing clinical research, including grant writing, regulatory issues, and quality assurance. Along the way, we will be teaching core statistical concepts including prevalence, risk ratios, and sensitivity and validation techniques. The objectives are for students to obtain an understanding of how and why to perform clinical research and to do so in an ethical and responsible manner.

Instructor(s): Valerie Press Terms Offered: Spring. Offered 2020

Prerequisite(s): Completed general education requirement in the social sciences. This course does not meet requirements for the Biological Sciences major.

Equivalent Course(s): BIOS 29327

Examples of Previously Offered Co-Undergraduate/Graduate Courses

CCTS 20400. Health Disparities in Breast Cancer. 100 Units.

Across the globe, breast cancer is the most common women's cancer. In the last two decades, there have been significant advances in breast cancer detection and treatment that have resulted in improved survival rates. Yet, not all populations have benefited equally from these improvements, and there continues to be a disproportionate burden of breast cancer felt by different populations. In the U.S., for example, white women have the highest incidence of breast cancer but African-American women have the highest breast cancer mortality overall. The socioeconomic, environmental, biological, and cultural factors that collectively contribute to these disparities are being identified with a growing emphasis on health disparities research efforts. In this 10-week discussion-based course students will meet twice weekly and cover major aspects of breast cancer disparities.

Instructor(s): E. Dolan, S. Conzen Terms Offered: Winter

Prerequisite(s): BIOS 25108

Equivalent Course(s): CCTS 40400, HLTH 20400, BIOS 25327

CCTS 20500. Machine Learning & Advanced Analytics for Biomedicine. 100 Units.

The age of ubiquitous data is rapidly transforming scientific research, and advanced analytics powered by sophisticated learning algorithms is uncovering new insights in complex open problems in biology and biomedicine. The goal of this course is to provide an introductory overview of the key concepts in machine learning, outlining the potential applications in biomedicine. Beginning from basic statistical concepts, we will discuss concepts and implementations of standard and state of the art classification and prediction algorithms, and go on to discuss more advanced topics in unsupervised learning, deep learning architectures, and stochastic time series analysis. We will also cover emerging ideas in data-driven causal inference, and demonstrate applications in uncovering etiological insights from large scale clinical databases of electronic health records, and publicly available sequence and omics datasets. The acquisition of hands-on skills will be emphasized over machine learning theory. On successfully completing the course, students will have acquired enough knowledge of the underlying machinery to intuit and implement solutions to non-trivial data science problems arising in biology and medicine.

Instructor(s): Ishanu Chattopadhyay Terms Offered: Winter. Not offered every year

Prerequisite(s): Rudimentary knowledge of probability theory, and basic exposure to scripting languages such as python/R is required. This course does not qualify in the Biological Sciences major.

Equivalent Course(s): CCTS 40500, BIOS 29208

CCTS 21005. The Making of the "Good Physician": Virtue Ethics and the Development of Moral Character in Medicine. 100.00 Units.

This multi-disciplinary course draws insights from medicine, sociology, moral psychology, philosophy, ethics and theology to explore answers to the unique challenges that medicine faces in the context of late modernity: How does one become a "good physician" in an era of growing moral pluralism and health care complexity? Students will engage relevant literature from across these disciplines to address issues regarding the legitimate goals of medicine, medical professionalism, the doctor-patient relationship, vocation and calling, the role of religion in medicine, and character development in medical education. The course will first introduce the challenges that moral pluralism in contemporary society presents to the profession of medicine along with the subsequent calls for a renewed pursuit of clinical excellence in today's complex health care system. It will then survey the resurgence of a philosophical discipline (virtue ethics) that has begun to shape contemporary debate regarding what types of "excellences" are needed for a good medical practice dominated by medical science and technology.

Instructor(s): John Yoon Terms Offered: Autumn Spring Winter

Note(s): This course is limited to those who have been accepted into the Emerging Scholars Cohort in Bioethics (Hyde Park Institute, <https://hydeparkinstitute.org/esc>). Depending on space availability, other students interested in enrolling will need prior approval from Course instructor(s). This course is a yearlong course with several 2-hour lecture discussions throughout the year, 2 all-day Saturday sessions (Fall/Spring), and an off-site practicum. Registration in Autumn, Winter, and Spring Courses is required. The spring quarter course will be worth 50 units.

Equivalent Course(s): CCTS 41005, MEDC 31005

CCTS 40006. Pharmacogenomics: Discovery and Implementation. 100 Units.

Pharmacogenomics is aimed at advancing our knowledge of the genetic basis for variable drug response. Advances in genetic knowledge gained through sequencing have been applied to drug response, and identifying heritable genetic variants that predict response and toxicity is an area of great interest to researchers. The ultimate goal is to identify clinically significant variations to predict the right choice and dose of medications for individuals—"personalizing medicine." The study of pharmacogenomics is complicated by the fact that response and toxicity are multigenic traits and are often confounded by nongenetic factors (e.g., age, co-morbidities, drug-drug interactions, environment, diet). Using knowledge of an individual's DNA sequence as an integral determinant of drug therapy has not yet become standard clinical practice; however, several genetics-guided recommendations for physicians have been developed and are highlighted. The ethics and economics of pharmacogenomics are also discussed.

Instructor(s): R. S. Huang, B. Stranger Terms Offered: Spring

Prerequisite(s): Undergraduates (third- and fourth-years only) must have taken BIOS 20187 and are required to email instructors for approval (bstranger@medicine.bsd.uchicago.edu and rhuang@medicine.bsd.uchicago.edu) prior to registering.

Equivalent Course(s): CABI 47510

CCTS 43100. Topics in Global Health. 100 Units.

This course is a continuation of Introduction to Global Health (CCTS 43000). It is designed to address specific medical issues of global significance including maternal and child health, communicable and non-communicable diseases, and emerging diseases; the course will also address the impact of population growth, migration, environmental decay, and humanitarian disasters on health. Finally, the course will discuss research and career opportunities within the field of global health.

Instructor(s): C. S. Olopade Terms Offered: Winter

Prerequisite(s): This course does not meet the requirements for the Biological Sciences major.

Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Times was used instead of Trajan.

Times was used instead of Palatino.

The editor may contact Leepfrog for a draft with the correct fonts in place.