Clinical and Translational Science

Department Website: https://chess.uchicago.edu/training-and-education/academic-courses (https://chess.uchicago.edu/training-and-education/academic-courses/)

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 (https://chicagoitm.org), 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 Fahad Sajid at fahad.sajid@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. Please refer to the CCTS section of the CHeSS website (https://chess.uchicago.edu/training-and-education/academic-courses/) for current course offerings and prerequisites for each course.

Examples of Previously Offered Co-Undergraduate/Graduate Courses

CCTS 20400. Health Disparities In Breast Cancer and Other Cancers. 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 9-week discussion-based course students will meet twice weekly and cover major aspects of disparities in breast cancer and other cancers.
Instructor(s): E. Dolan, S. Conzen Terms Offered: Winter
Prerequisite(s): BIOS 25108
Note(s): GP.
Equivalent Course(s): BIOS 25327, CCTS 40400, GNSE 30408, GNSE 20408, HLTH 20400

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

CCTS 21005. Scholars in Ethics and Medicine Cohort (SEM) 100.00 Units.
This multidisciplinary 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): Kathryn Rowland Terms Offered: Autumn Spring Winter
Note(s): This course is limited to those who have been accepted into the Scholars in Ethics and Medicine (Hyde Park Institute, https://hydeparkinstitute.org/sem). Depending on space availability, other students interested in enrolling will need prior approval from course instructor(s). This is a yearlong course with several two-hour lecture discussions throughout the year, and two all-day Saturday sessions (Fall/Winter). Students register for winter or spring to receive credit, though must participate in each quarter.
Equivalent Course(s): MEDC 31005, CCTS 41005

CCTS 21011. Clinical Research Design and Interpretation of Health Data. 100 Units.
This course will introduce the interdisciplinary field of clinically oriented health services research with a focus on the interpretation of health-related metrics and policy-related applications. We will examine how translational medical science informs healthcare providers, payers, and professional societies. COVID-19 and postmenopausal hormone replacement therapy will illustrate the challenges of data interpretation, translation of research findings into clinical medicine, and the adoption of evidence-based guidelines. Using a highly interactive approach, students will gain experience in selection of research study designs, measurement of health status, risk adjustment, causal inference, and understanding the placebo effect. We will discuss how clinicians, administrators, and public reporting entities judge and use information derived from investigations. The COVID-19 pandemic will demonstrate the challenges that varied clinical presentations, diagnostic accuracy, and case definition (identification of diseased patients) create in the formulation of health statistics (e.g., case-fatality rates and disease attribution of mortality). We will also discuss methods of defining study populations for both clinical research and public health reporting.
Instructor(s): Gregory Ruhnke Terms Offered: Spring
Equivalent Course(s): BIOS 29331, HLTH 21011, CCTS 41011, PBPL 21011

CCTS 21014. Religion and AIDS. 100 Units.
The AIDS crisis was not an epoch that we survived. It is a battle that we are still fighting…when Americans talk about AIDS they are rarely just talking about a scientific problem or a pharmaceutical solution. They are instead offering a sociology of suffering and a plan for spiritual warfare." - Kathryn Lofton Is it possible to understand current debates over public health or the role of religion in the public sphere without first examining religious responses to the AIDS crisis? This course focuses on the emergence of the AIDS epidemic during the peak of the American culture wars. As such, students will analyze the fraught intersection of political power structures, medical epistemologies, and religious views on bodies, sex, and public morality. Through a varied catalog of disciplinary frameworks, e.g., history, theology, medical ethics, sociology of religion, and history of medicine, students will weigh the accuracy of Lofton's claim that for Americans, AIDS is more than just a disease. Thus, we will scrutinize moral rhetoric surrounding contraception and its public availability. We will discuss the extent to which religious philanthropy, especially on the international stage, reshaped approaches to global health. Finally, we will revisit the role of religious communities in providing both care for the sick and theological responses to suffering. Prior knowledge of religious studies and/or medical history is not required for the course.
Instructor(s): Mark M. Lambert Terms Offered: Autumn
Equivalent Course(s): HIPS 26301, SOCI 20563, HLTH 26301, HMRT 26301, CHST 26301, RLST 26301, PBPL 25301, GNSE 23142, HIST 28007

CCTS 21015. Religion and Abortion in American Culture. 100 Units.
In American public discourse, it is common to hear abortion referred to as a "religious issue." But is abortion a religious issue? If so, in what ways, to whom, and why? In this course we will answer these questions by tracing the relationship between religion and abortion in American history. We will examine the kinds of claims religious groups have made about abortion; how religion has shaped the development of medical, legal, economic, and cultural perspectives on the topic; how debates over abortion have led to the rise of a certain kind of religious politics in the United States; and how issues of race, class, gender, sexuality, and the body are implicated in this conversation. Although the course will cover a range of time periods, religious traditions, and types of data (abortion records from Puritan New England, enslaved people's use of herbal medicine to induce miscarriage, and Jewish considerations of the personhood of the fetus, among others), we will give particular attention to the significance of Christianity in legal and political debates about abortion in the twentieth and twenty-first centuries. There are no prerequisites for this course and no background in Religious Studies is required. However, this course may be particularly well-suited to students interested in thinking about how certain themes or areas of study-medicine and medical sciences, gender and sexuality, race and ethnicity, political science-converge with religion and Religious Studies.

Instructor(s): Emily D. Crews Terms Offered: Autumn
Equivalent Course(s): HLTH 26304, AMER 26304, RLST 26304, ANTH 26304, SSAD 26304, HIST 28008, SOCI 20564, GNSE 12115, HIPS 26304, PBPL 25304, HMRT 26304

CCTS 21016. Indigenous Religions, Health, and Healing. 100 Units.
This course introduces students to the dynamic, often-contested understandings of health, healing, and religion among the Indigenous peoples of the Americas. Our task will be threefold: first, to examine the drastic effects of settler colonialism upon the social determinants of health for Indigenous peoples throughout the Americas, including the Caribbean, Mexico, United States, and Hawaii. Second, we shall attempt to understand healing practices as they are steeped in and curated by Indigenous traditions and religious beliefs. Our goal is to counteract centuries-old stereotypical images of Native peoples and challenge our preconceived notions of wellness, selfhood, and the boundaries of medicine. Third, we will reflect upon contemporary Indigenous approaches to health and healing with particular attention to the postcolonial hybridity of these practices. Throughout the course we will attend to a generative diversity of epistemologies, anthropologies, and religious worldviews with the ultimate goal that a renewed understanding of Indigenous healing traditions will augment our own approaches to global/public health and the study of religion.
Instructor(s): Mark M. Lambert Terms Offered: Winter
Equivalent Course(s): HLTH 27501, KNOW 27501, RLST 27501, CHST 27501, HIPS 27520

CCTS 21018. Buddhism and Science: A Critical Introduction. 100 Units.
Buddhism is the only religion able to cope with modern scientific needs." This quotation, often erroneously attributed to Albert Einstein, prompts the question: Why are such statements about Buddhism so easily taken nowadays as credible and plausible? Currently, it seems no other religion is held as compatible with science as Buddhism: From the recent 'mindfulness' craze in psychology and medicine, to the 'Emptiness' of quantum physics, Buddhism is uniquely hailed as a 'rational religion' whose insights anticipated modern science by millennia. Some even suggest it is not a 'religion' at all, but rather a sort of 'mind-science.' This course functions as both an introduction to Buddhism and a critical survey of its modern scientific reception. As we explore Buddhism's relationship to contemporary scientific theories in psychology and physics, we will be guided by questions such as: What methodological principles distinguish the practices of religion and science? What are the different ways they can be brought into relation? Why is Buddhism, in particular, singled out as uniquely scientific? What modern historical factors, like colonialism and secularization, contribute to this contemporary meme? Why does it matter whether Buddhism is compatible with science or not? What, exactly, is at stake in this relationship? And for whom? No prior study of Buddhism or the philosophy of science is expected.
Instructor(s): Jesse Berger Terms Offered: Spring
Note(s): This course counts as a Cognitive Science extra-disciplinary course.
Equivalent Course(s): RLST 24240, HIPS 24240, KNOW 24240

CCTS 21019. Deviance and Medicalization. 100 Units.
Is a school shooter an evil sinner, an ordinary criminal, or mentally ill? Is homosexuality a natural mode of loving and living, an expression of moral weakness, a punishable criminal offense, or a sign of biological or psychological inversion? Is hearing voices a sign of madness to be shunned and locked away from society, or proof of being chosen by the gods? The way in which a society or individual answers these kinds of questions can help us to understand the ways in which that society medicalizes (or demedicalizes) different forms of deviance from hegemonic norms. In this course we will explore various arenas in which forms of deviance have shifted on the spectrum from sin to crime to sickness (and back again) through processes of medicalization and demedicalization. We will explore medicalization in connection with sexual, mental, and moral forms of deviance as well as the medicalization of identity in terms of race, gender, class, disability, and age in order to ask questions such as: How is medical knowledge and authority constituted? How and why do certain behaviors come to be framed as medical problems rather than moral or legal ones? What people, forces, or systems shape the way we view deviant behavior? What is at stake in such processes of (de)medicalization. How do such processes impact the lives of those involved? How has life been increasingly medicalized in the Covid era? No prior study of religion, critical theory, or the history of medicine is expected.
Instructor(s): Blaize Gervais Terms Offered: not being offered 2022-23
Equivalent Course(s): HLTH 26320, GNSE 26320, RLST 26320

CCTS 21020. Magic and Divination in the Islamic World. 100 Units.
From weather forecasts to stock market speculations, our modern world is saturated with predictions for the future. In spite of this, other divinatory methods such as astrology are often portrayed as superstitious, irrational, or unreligious. This course will introduce students to the unexpected interaction of science, magic, and religion through the exploration of divination in the Islamic world. We will ask how divination can be a part of religious practice and how methods of future-telling are said to "work" from the perspective of the philosophers and scientists who practiced them. We will also explore the arguments against divination and identify and understand religious and/or scientific objections to the practice. All readings will be in English translation.
Instructor(s): Alex Matthews Terms Offered: Winter
Equivalent Course(s): NEHC 28882, MDVL 28882, RLST 28882, KNOW 28882, HIPS 28882

CCTS 21021. Magic, Miracles, and Medicine: Healthcare in the Bible and the Ancient World. 100 Units.
This course examines the complex issues surrounding the body, disability, and medical care in antiquity. It will be guided by a variety of questions, such as what was the root cause of bodily infirmity and disease in antiquity?

How did cultural views of sex, gender, and race influence perceptions of the body and what it meant to be able bodied? Such questions are significant when considering what kind of access to healthcare marginalized groups had. In order to explore these questions, we will examine ancient Mediterranean views of medical care through material remains (e.g., magical amulets and healing shrines) and textual evidence (e.g., Galen and Hippocrates). After considering this wider cultural context, we will examine treatments in the Hebrew Bible, New Testament, and early Christianity. We will also explore how Christian concepts of medical care evolved in light of accounts of Jesus as a divine healer. In addition to this ancient evidence, we will engage with modern disability studies and sociological analyses to better orient our readings. At the end of the course, students will be better acquainted with the complex relationship between religion and medicine and how that affects modern healthcare decisions.
Instructor(s): Richard Zaleski Terms Offered: Spring. Not offered 2025–26
Equivalent Course(s): HLTH 20223, HIST 25305, JWSC 20923, HIPS 20223, RLST 20223, KNOW 20223

CCTS 21022. Judaism, Medicine, and the Body. 100 Units.
For centuries the "Jewish doctor" has existed as an archetype, but is there such a thing as Jewish medicine? Does Judaism teach a distinct approach to the body, illness, and healing? And more significantly, why should religion have anything to do with one's health today? In this course we will grapple with our assumptions regarding modern Western medicine by discussing topics in Jewish medical thought and ethics. We will study how Judaism - its texts, history, laws, and traditions - intersect with issues of science, medicine, and the body. In particular we will think about how a Jewish approach to medicine, and more broadly a religious approach, might complicate contemporary assumptions about the body and healing. We will also consider how Jewish bodies have been imagined and stereotyped, and think about how that might affect Jewish approaches to disease and medical ethics. This course will thus offer students a way to think about alternatives to assumptions about medicine, the body, and ethics in the secular West, which will be explored both in class materials and in personal projects. No prior work in Jewish studies, medical ethics, or religious studies necessary.
Instructor(s): Ranana Dine Terms Offered: Autumn. Not offered 2025–26
Equivalent Course(s): JWSC 26313, HLTH 26313, GNSE 26313, KNOW 26313, RLST 26313, HIPS 26313

CCTS 22006. Decision Modeling for Health Economic Evaluation. 100 Units.
This course introduces decision science and economic evaluation that has been increasingly used to inform public health and health care decisions. With a specific focus on the development and application of decision-analytic models, students will learn the state of the current practice of economic evaluation, new tools and methodologies to conduct decision modeling, and emerging areas of research, including the value of information analysis. The course will provide hands-on computer-based learning using the R programming language for data analysis and modeling. A prior experience in R is welcomed, but not required. Applying the concepts and techniques learned in the course, students will undertake a course project of their choice to conduct economic evaluation using decision-analytic models. By the end of this course, students will gain knowledge and practical skills in economic evaluation and decision modeling to help make informed decisions.
Instructor(s): David Kim Terms Offered: Winter
Equivalent Course(s): PBPL 22006, PBHS 38120, CCTS 42006, PPHA 42006, HLTH 22006

CCTS 23300. Religion and Psychiatry. 100 Units.
This course will investigate the many theoretical and practical problems which emerge where the domains of psychiatry and religion overlap. We will explore questions such as: What are the common realities that religious and psychiatric frameworks seek to explain? Are being "divinely inspired" and being "mad" mutually exclusive? How do religious and other cultural categories shape the development of what are called "mental disorders"? Are cognitive behavioural therapists more effective than witchdoctors at restoring people to health? We will begin with a brief overview of the history of psychiatry, before analyzing a famous case of mass demonic possession in 17th century France. We will take several weeks to explore contemporary psychiatric diagnoses, contrasting how psychiatrists and religious authors describe similar symptoms in different ways. We will compare diverse therapeutic methods, modern and traditional, to ask what makes each of them effective or ineffective. Finally, we will survey proposed alternatives to the prevailing diagnostic frameworks within psychiatry, asking which, if any, our study of the overlapping domains of religion and psychiatry might lend support.
Instructor(s): Owen Joyce-Coughlin Terms Offered: Spring
Equivalent Course(s): COGS 26802, RLST 23300, HLTH 23300, ANTH 23301

CCCT 28307. Populism in the United States: Past and Present. 100 Units.
This course will explore the long history of populism in the United States, a history that raises fundamental questions about the nature of US politics, law, and society. These include ongoing disputes over the ownership and control of wealth; the rights and duties of individuals to each other as well as to the commonweal; the relationship of citizens to their nation; reigning definitions of justice and the good life; and the currency of racism, jingoism, paranoia, antisemitism, and demagoguery in US democratic politics. Such large subjects will be engaged through an historical investigation, beginning with the War of Independence. The course will finish by examining the putative re-emergence of "populism" in recent years, particularly since the financial crisis of 2008, to include global comparisons.
Instructor(s): J. Levy and M. Zakim
Equivalent Course(s): LLSO 28307, HIST 28307, HIST 38307

CCTS 33000. Scientists Advancing the Forefront. 000 Units.
In this survey course, leading basic and translational biomedical scientists will review cutting-edge themes that constitute the forefront of medical research. Learners will emerge with a broad understanding of: •
Instructor(s): Erika Claud, Ronald Cohen Terms Offered: Spring Winter. Students who register in fall and spring will earn 50 credit units in spring.
Prerequisite(s): Course open to MS1 students
Note(s): Students should email Natasha Beals at nbeals@bsd.uchicago.edu to request permission to enroll.
Equivalent Course(s): MOLM 33000, MEDC 33000

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