

Course #	Course Name	Credit Hours	Course Description
Summer Courses			
DCS 5103	Clinical Research Questions & Methods CORE	1	Defining and developing a research question; distinguishing between correlative and mechanistic questions, matching methods to questions, understanding bias and confounding, random and systemic error, quantifying clinical information.
DCS 5106	Grant Writing & Funding Strategies CORE	1	This course will review the different types of federal grant mechanisms as well as grants or contracts from research foundations, advocacy organizations and industry. How to write a persuasive, well-reasoned application will be the focus of the course including the budget, resources and environment, preliminary data, and the research plan.
DCS 5107	Responsible Conduct of Research CORE	1	Regulatory requirements of clinical research (IRB, GCP, HIPAA, and investigational filings), ensuring patient safety, interactions with government and industry, contract negotiations, successful strategies and tactics.
Fall Courses			
DCS 5105	Ethics in Clinical Science	1	Introduction to ethical reasoning and related processes, techniques of settling disagreements among people, treatment versus research, informed consent, clinical research relevant to third parties, dealing with unexpected scientific and clinically important findings, getting what you want from mentors, consent and risk issues with unproven biological markers, conflicts of interest/duty, handling misconduct and fraud, ethics of subject recruitment, compensating for injuries or medical errors in research, talking to media, public policy advising, authorship order and publications, gender and ethnicity in sciences careers.
DCS 5391	Mathematical Biostatistics for the Clinical Investigator CORE	3	Traditional, mathematical approach to statistical analysis of biomedical data. Topics include data description, summary statistics, elements of probability, distributions of random variables including applications of the binomial and normal distributions, estimation and confidence intervals, hypothesis testing, analysis of variance, correlation and regression and contingency tables. Additional topics include statistical power, sample size, and study design.
DCS 5309	Conceptual Biostatistics for the Clinical Investigator CORE	3	Conceptual approach to statistical analysis of biomedical data. Review of fundamental statistical principles focusing on explanation of the appropriate scientific interpretation of statistical tests rather than the mathematical calculation of the tests themselves. The course covers All topics typically used in biomedical publications, including data description, summary statistics, p values, and non-parametric tests, analysis of variance, correlation, regression, and statistical power & sample size estimation.
DCS 5301	Clinical Research Design & Analysis CORE	3	Basic and intermediate level principles in research design; formulation of the research question; identifying primary and secondary structures; use of control groups and pre-specified hypotheses; surrogate measurements; analysis of incomplete data; meaning of P values and confidence intervals; identification of bias and flaws in study design.
DCS 5115	Clinical Research from Proposal to Implementation	1	This course reviews basic elements for a research proposal and implementation. Topics include regulatory approvals; continuing regulatory oversight; monitoring patient safety; recruitment; clinical assessments, data treatment, data collection, entry and auditing; provision of experimental tests/tasks; data analyses; publication planning.

DCS 5201	Developing & Validating Measures in Clinical Research	2	This course concerns principles of creating, evaluating and validating instruments and scales for the quantification of human responses and clinical events and the influence and interaction of physiological and behavioral factors. Students will engage in some data analysis so that they can better interact with psychometric specialists. Much of this course necessarily deals with statistics, but the stress is on practical considerations of constructing measures. Emphasis is given to what is generally known as “quality of life” measures. Much of the course involves the basics of factor analysis, which is essential to the analysis of scales.
DCS 5203	Clinical Pharmacology & Drug Development	2	Pharmacokinetics; pharmacodynamics; drug absorption, distribution, metabolism/elimination; drug-drug and drug-disease interactions; preclinical drug development (Phase I, II, III and IV); proof-of-concept and dose-finding studies; post-marketing surveillance.
HI 5310	UT Health Science Center at Houston - Foundations of Health Informatics I (Online) CORE	3	Foundations of Health Informatics I is designed to provide an overview of current issues and future challenges in the field of health information sciences. At the end of the course, students will be able to: Apply the thought processes of health informatics to real world problems; discuss the advantages and disadvantages of using information technology in healthcare; discuss the role of data, information, and knowledge in modern healthcare; read and discuss the contemporary informatics scientific literature.
Spring Courses			
DCS 5207	Introduction to Patient Centered Outcomes Research & Comparative Effectiveness Research	2	This course covers the methods used in outcomes and health services research, which includes research design, theory, measurement, methods of analysis and evaluation of published research. Course objectives are: 1) describe basic concepts, definitions, and types of outcomes and health services research; 2) understand structure, process, outcomes and underuse, misuse, overuse conceptual models; 3) identify common approaches and challenges to measuring cost, quality, access, and equity in health and health care; 4) describe experimental and observational research designs used to assess the impact of health services (drugs, devices, procedures, strategies, delivery and financing systems) on patient-oriented, clinical, and resource use outcomes.
DCS 5302	Biostatistics for Clinical Sciences II	3	Linear and logistic regression models (control of confounding and predictive models); categorical data analysis (binomial and Poisson distributions, analysis of paired categorical data, nonparametric methods for ordinal data); survival analysis (Kaplan-Meier curves. Hazard functions, types of censoring, log-rank tests and generalized Wilcoxon tests, Cox regression model).
DCS 5116	Clinical Research Protocol Development CORE	1	Practical aspects of research protocol conceptualization and development. Enrollees will learn how to translate a research question into a hypothesis; how to identify and describe hypothesis appropriate study subjects and study measurements; select a specific study design appropriate to the research question and resources available; synthesize the elements into a study plan; develop a statistical section and analytical plan. Protocols developed by the enrollees will form the primary basis for group discussions.
DCS 5307	Epidemiology for the Clinical Investigator	3	Concepts of multivariate causality; criteria for establishing causality; risk; rates; incidence, prevalence and attack rates; incidence density; crude, specific and adjusted rates; relative risk, odds ratio, case-fatality rate and attributable risk; sampling error, selection bias, information bias, definition bias, and confounding; statistical techniques to control for bias; variables; overview of statistical analysis; multiple comparisons correction; study designs to avoid bias: survey and sample selection, cross-sectional, cohort, case-control; prospective vs. retrospective; attributes of cohort studies; design principles of case-control studies; types of control groups; strategies of matching in case-control studies; experiential introduction to statistical computing for different types of clinical epidemiology studies.

DCS 5208	Clinical Research Management & Leadership CORE	2	This course is a structured review and discussion of the basics of management and leadership theory and practice. Topics include project management and budgeting, information systems, leadership style, effective interviewing and hiring techniques, conflict resolution, and the basics of organizational culture. Predominant theories and research, as well as shared experiences of the instructor and the group will be discussed in order to enhance each participant's effectiveness as a manager and leader. It will be a combination of assigned readings, didactic lectures, active group discussion, a mid-term project and final examination.
BCSI 5096.0 1 / 5214	Quantitative Analysis of High Content/High Complexity Data Sets	1.5	Second half of spring semester. The goal of this course is to teach students about how high content / high complexity data sets are generated and analyzed to extract information, and how the information is analyzed and integrated to generate knowledge. The course will begin with an overview of the types of high content data sets generated from a variety of discovery platforms (i.e., genomics, proteomics, metabolomics, imaging, structure), the information they include, and their architecture. This will be followed by series of lectures on data preprocessing (focusing on quality control and reproducibility) and the basics of high content data set analyses. This introductory material will be followed by a series of lectures exemplifying the types of data and analyses associated with the various discovery platforms. The course will conclude with a series of lectures on specific approaches to data analysis and integration. During the course, the students will be exposed to programming languages, such as R and its statistical packages, as well as a variety of bioinformatic tools that are available on the internet. The course material will include theoretical and conceptual, as well as practical and applied, presentations.
GD 5141	Advanced Genetics II: Human Genetics	1.5	Second half of spring semester. The course introduces students to the conceptual basis of human genetics research. Some of the classes review basic principles of medical genetics, since many students do not have any prior exposure to this subject, but discussions emphasize research applications rather than clinical problems. Topics include discovering the molecular basis of Mendelian disorders and complex traits through molecular cytogenetics, genetic linkage, and candidate gene and genomewide association methods. Discussion of research papers drawn from the current literature is used to illustrate each of these approaches.
CR 5301	Mechanisms of Drug Action	3	The course is designed to cover a broad range of topics from fundamental principles in drug action to commercial applications. We start by examining how drugs interact with their receptors to induce their effects. We will discuss allosteric regulation, receptor desensitization and intracellular trafficking, and biophysical methods to analyze drug-receptor interactions. We then review how drugs enter, distribute and become eliminated from the body and the mathematical analysis of their pharmacokinetics, as well as the development of drug tolerance and dependence. Next, we learn the principles underlying the action of a few selected classes of drugs and receptors. The second half of the course deals with specialized topics, including drugs used in psychiatry and drugs of abuse, in the chemotherapy of bacterial and virus infections, and in the treatment of parasitic diseases and the problems of developing drugs for Third World countries. We go on to discuss drugs affecting cholesterol homeostasis, prostaglandins and leukotriene pharmaceuticals, and the basis of drug interactions. We discuss emerging cancer therapeutics (antibodies, RNA, DNA, gene therapy, nanoparticles). The final lecture concerns the process of drug development in the pharmaceutical industry and the scientific and commercial complexities of getting the drug from the laboratory to the bedside.

HI 5310	UT Health Science Center at Houston - Foundations of Health Informatics I (Online) CORE	3	Foundations of Health Informatics I is designed to provide an overview of current issues and future challenges in the field of health information sciences. At the end of the course, students will be able to: Apply the thought processes of health informatics to real world problems; discuss the advantages and disadvantages of using information technology in healthcare; discuss the role of data, information, and knowledge in modern healthcare; read and discuss the contemporary informatics scientific literature.
Semester Varies			
DCS 5114	Preparing a Journal Report	1	General writing skills and strategies; how to prepare an empirical article including tips on writing the abstract, introduction, aims, methods, results, and discussion/conclusion sections of a peer reviewed journal article. Students will be required to submit a journal article and review others' articles.
DCS 5113	Advanced Clinical Research Design & Analysis	1	By the end of the course, students will be able to critically review and critique the methods of scientific journal articles pertinent to academic medicine.
DCS 5096	Independent Study/Special Topics	1-3	
Other			
	Online courses offered through the University of Texas Health Science Center at Houston.		<u>Courses offered through the School of Public Health in the division of Health Promotion & Behavioral Sciences</u> <u>Courses offered through the School of Biomedical Informatics</u>

UTSW Graduate School of Biomedical Sciences Division of Clinical Science Required Courses for Master of Science in Clinical Science Effective Fall 2014				36 Credit Hours
				3 Years Maximum
Course #	UTSW Courses/Practicum	Credit Hours	Semester	15 Credit Hours Core Coursework; 15 Credit Hours Practicum Credit; 6 Credit Hours Elective Coursework
DCS NEW	Practicum: Research Project	5	N/A	required
DCS NEW	Practicum: Publishable Manuscript	4	N/A	required
DCS NEW	Practicum: Extramural Research Grant Application	6	N/A	required
DCS 5107	Responsible Conduct of Research	1	Summer	required
DCS 5208	Clinical Research Management & Leadership	2	Spring	required
DCS 5301	Clinical Research Design & Analysis	3	Fall	required
DCS 5309/5391	Biostatistics I (Conceptual or Mathematical)	3	Fall	required
DCS 5116	Clinical Research Protocol Development	1	Spring	required
DCS 5106	Grant Writing & Funding Strategies	1	Summer	required
DCS 5103	Clinical Research Questions & Methods	1	Summer	required
HI 5310	UT Health Science Center at Houston - Foundations of Health Informatics I (Online)	3	Fall/Spring	required
DCS 5105	Ethics in Clinical Research	1	Fall	elective
DCS 5302	Biostatistics II	3	Spring	
DCS 5115	Clinical Research from Proposal to Implementation	1	Fall	
DCS 5307	Epidemiology for the Clinical Investigator	3	Spring	
DCS 5201	Developing & Validating Measures	2	Fall	
DCS 5203	Clinical Pharmacology & Drug Development	2	Fall	
DCS 5207	Intro to Patient Centered Outcomes Research & Comparative Effectiveness Research	2	Spring	
DCS 5113	Advanced Clinical Research Design & Analysis	1	TBD	
GD 5141	Advanced Genetics II: Human Genetics	1.5	Spring	
CR 5301	Mechanisms of Drug Action	3	Spring	
BCSI 5096.01/5214	Quantitative Analysis of High Content/High Complexity Data Sets	1.5	Spring	
DCS 5114	Preparing a Journal Report (Scientific Writing Workshop)	1	TBD	
DCS 5096	Independent Study	1-3	All	
	<i>UT Health Science Center at Houston Courses in Public Health and Bioinformatics</i>			