University of Colorado
Denver | Anschutz Medical Campus

Clinical Science Program Course Book

CLINICAL SCIENCE COURSES

CLSC 6060 Analysis, Modeling, and Design 3.0 cr.

Dr. M. Saleh (mohamad.saleh@ucdenver.edu) (Fall)
Cross listed: CU Denver ISMG 6060. Prereq: Application development experience.
Collaborative offering with Denver Campus, emphasizing information requirements analysis, logical system specification, detailed system design. Topics include structured system development methodologies, prototyping, file design, systems architecture, systems testing, software design strategies. Students use case tool to develop system specifications.

CLSC 6080 Database Management Systems 3.0 cr.

A. Bani Hani (anoud.banihani@ucdenver.edu) ((Fall)
Cross listed: CU Denver ISMG 6080. Prereq: Application development experience.
Offered as a collaborative offering with UCD, this course focuses on the development and management of database systems to support business operations. Important subjects include semantic data modeling, normalization, SQL, fourth generation languages, and client-server database applications.

CLSC 6210 Research Seminars in Clinical Science 1.0 cr

Dr. A. Prochazka (allan.prochazka@cuanschutz.edu) (Fall, Spring)
Course is taken over two semesters (register once)
This course provides an overview of the types of clinical translational studies being conducted by senior CLSC doctoral students. The interactive seminar series structure allows for interdisciplinary scientific dialogue among students at various stages of training, mentors and faculty.

CLSC 6211 Immersion in Community Engagement 3.0 cr.

Dr. L. Cicutto (lisa.cicutto@cuanschutz.edu) (Summer)
Prereq: Program consent (contact CLSC administrator for consent)
This course focuses on community-based participatory research, community engagement and understanding health disparities through a community immersion experience.

CLSC 6260 Conducting Clinical Trials for Investigators 2.0 cr.

Dr. L. Caplan (liron.caplan@cuanschutz.edu) (Summer)
Prereq: For non-CLSC students, please seek consent of the instructor.
Course is for investigators conducting clinical trials. Course covers good clinical practices/regulations that surround setting up and running clinical trials. Clinical studies and popular press articles highlighting what can go wrong in clinical trials will be reviewed and discussed.

CLSC 6270 Critical Appraisal Seminars in Clinical Science 1.0 cr.

Dr. L. Cicutto (lisa.cicutto@cuanschutz.edu) (Fall)
This course provides an overview of the approaches for the critically appraising common study designs published in the clinical and translational sciences literature, as well as other sources of information.

CLSC 6300 Scientific Grant Review Process: CCTSI Proposals – Masters 1.0 cr.

Drs. J. Maloney (james.maloney@cuanschutz.edu) (Spring)
Prereq: Completion of required courses in biostatistics (BIOS 6601 and 6602 or BIOS 6611 and 6612).
Students will understand and participate in the process of scientific review of human subject research protocols submitted to the University of Colorado Denver Clinical Translational Research Centers at University Hospital and The Children's Hospital.

CLSC 6460 Rare Diseases Translational Research and Clinical Trial Applications 1.0 cr.

Dr. M. Taylor (matthew.taylor@cuanschutz.edu) and Dr. C. Coughlin (curtis.coughlin@cuanschutz.edu) (Fall)
Prerequisites: Familiarity with biostats and study design is recommended.
The purpose of this course is to deepen understanding of human rare diseases and the translational research approaches to rare disease research. The course will broadly cover rare disease epidemiology, patient/subject identification and registries, data extraction from databases, subject recruitment, rare disease clinical trial designs, pediatric considerations, and grant funding.

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CLSC 6560 Designs and Mixed Methods in Implementation Research 3.0 cr.

Dr. C. Studts (christina.studts@cuanschutz.edu) (Spring)
This course is for D&I Certificate Students
This course provides an in-depth examination of study designs, comparative effectiveness research, and qualitative, quantitative and mixed methods approaches to dissemination and implementation research. The focus is application to health care and public health settings.

CLSC 6580 Qualitative and Mixed Methods in Health Research 3.0 cr.

Dr. S. Brewer (sarah.brewer@cuanschutz.edu) and Dr. E. Broaddus (elena.broaddus@cuanschutz.edu) (Spring)
This course is for CLSC Students
This course provides an in-depth examination of qualitative and mixed methods approaches that are pertinent to health research.

CLSC 6650 Guided Research Tutorial – Masters 1.0-3.0 cr.

Dr. Lisa Cicutto (cicuttol@njhealth.org) (Fall, Spring, Summer)
Prereq: Program consent, approved course plan (contact CLSC administrator for consent)
This is an independent study course developed by the student and appropriate faculty member based on the area of study. Students meet regularly with the selected course instructor. The student and course instructor will develop a course plan prior to registration of the course.

CLSC 6653 Key Concepts in Neuro-developmental Disabilities 1 2.0 cr.

Dr. J. Reaven and D. Johnson (dina.johnson@cuanschutz.edu) (Fall)
Prereq: A degree in health care profession or related field or instructor consent.
Course represents part one of two-part interdisciplinary course series focused on systems, options for diagnosis/assessment and alternatives for service provision related to children/youth/young adults with neurodevelopmental and related disabilities and their families to address this population's special health care needs.

CLSC 6654 Key Concepts in Neuro-developmental Disabilities 2 2.0 cr.

Dr. J. Reaven and D. Johnson (dina.johnson@cuanschutz.edu) (Spring)
Prereq: A degree in health care profession or related field and completion of CLSC 6653, or Instructor consent.
This course represents part two of a two-part interdisciplinary course series focused on service provision, intervention strategies and service provision related to children/youth/young adults with neurodevelopmental and related disabilities and their families to address this population's special health care needs.

CLSC 6661 Leadership Dialogues I 2.0 cr.

Dr. J. Reaven and D. Johnson. Program contact: Dina Johnson (dina.johnson@cuanschutz.edu) 303-724-7673 (Summer)
Prereq: A degree in health care profession or related field or instructor consent.
This interdisciplinary leadership course focuses on leadership strategies needed for providing family-centered, culturally competent, community-based services for children with special needs and their families.

CLSC 6662 Leadership Dialogues II 1.0 cr.

Dr. J. Reaven and D. Johnson (dina.johnson@cuanschutz.edu) 303-724-7673 (Spring)
Prereq: A degree in health care profession or related field or Instructor consent, CLSC 6661
This interdisciplinary leadership course focuses becoming change agents to better provide family-centered, culturally competent, community-based services for children with special needs and their families.

CLSC 6663 Intervention for Individuals with Developmental Disabilities 3.0 cr.

TBD. Program contact: Dina Johnson (dina.johnson@cuanschutz.edu) 303-724-7673 (Spring)
Prereq: A degree in health care profession or related field or Instructor consent.
This interdisciplinary course reviews evidence-based practices in intervention for children with autism and other neurodevelopmental disorders, presented through lectures, critical readings of the literature, case discussions, and case presentations.

CLSC 6668 Screening/Assessment for Children/Youth with Autism and Other Neurodevelopmental Disabilities 3.0 cr.

Dr. A. Blakeley-Smith. Program contact: Dina Johnson (dina.johnson@cuanschutz.edu) 303-724-7673 (Fall)
Prereq: Degree in health care profession or related field or consent of instructor.
This interdisciplinary course presents best practices in screening/assessment for autism, focusing on: identification of symptoms of autism; differentiation of autism from other disorders; recognition of symptoms; examination of culture on clinical presentation; and approaches to share observations.

CLSC 6699 Masters Research Project – Publishable Paper 1.0-6.0 cr.

Dr. L. Cicutto (lisa.cicutto@cuanschutz.edu) (Fall, Spring, Summer)
Prereq: Program consent (contact CLSC administrator for consent)
During this course students working with his/her research mentor and research project committee to plan, execute, and write the Final Research Project in the form of a publishable paper. In addition, students will prepare for the Final Research Project Examination. This is a capstone course.

CLSC 6750 Designing for Dissemination and Sustainability 2.0 cr.

Drs. B. Kwan (bethany.kwan@cuanschutz.edu) and L. Lennox (lindsay.lennox@cuanschutz.edu) (Fall)
This course is one of three that focuses on dissemination and implementation research. This course reviews the organization and financing of interventions for health care systems and public health systems. The role of ethics, evidence, and health equity are examined.

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CLSC 6770 D&I Grant Funding 2.0 cr.

Drs. R. Glasgow (russell.glasgow@cuanschutz.edu) and A. Maw (anna.maw@cuanschutz.edu) (Summer)
Prereq: Completion of CLSC 7653 Dissemination and Implementation Research in Health
This course provides an in-depth examination of issues in submitting successful grant proposals in Dissemination & Implementation research. The course will build upon good general practices in grant and manuscript preparation and submission

CLSC 6850 Advanced Research Topics in Dissemination and Implementation Science 1.0 cr.

Drs. K. Trinkley (katy.trinkley@cuanschutz.edu) and N. Wagner (nicole.wagner@cuanschutz.edu) (Fall)
Prereq: CLSC 7653 or instructor permission
Hybrid - Provides an overview of intermediate and advanced dissemination and implementation (D&I) science research methods in a small group discussion format. This interactive seminar series structure allows for interdisciplinary scientific dialogue among students at various stages.

CLSC 7101 Grant Writing I 1.0 cr.

Dr. L. Cicutto (cicuttol@njhealth.org) (Spring); M. Plomondon (meg.plomondon@cuanschutz.edu) and A. Prochazka (allan.prochazka@cuanschutz.edu) (Fall)
Prereq: BIOS 6601 and EPID 6630; Program consent (contact CLSC administrator for consent). For non-CLSC students, please seek consent of the instructor.
This course prepares students to write research grant submissions. Topics covered include writing the various sections of grants: background, specific aims, hypotheses, methods, analysis, potential problem, and the summary. A fully prepared grant submission is required at the end of the course.

CLSC 7102 Grant Writing II 1.0 cr.

Dr. L. Cicutto (cicuttol@njhealth.org) (Spring); M. Plomondon (meg.plomondon@cuanschutz.edu) and A. Prochazka (allan.prochazka@cuanschutz.edu) (Fall)
Prereq: BIOS 6601 and EPID 6630, CLSC 7101; Program consent (contact CLSC administrator for consent). For non-CLSC students, please seek consent of the instructor. This course builds on CLSC 7101 and further prepares students for subsequent grant submissions. Strategies for preparation (including hypothesis generation, experimental design, statistical considerations, and potential problems) will be discussed. At the end of the course, a KO8, R23, or equivalent national grant application will be completed for submission. A fully prepared grant submission is required at the end of the course.

CLSC 7150 Ethics and Responsible Conduct of Research 1.0 cr.

Dr. S. Hogan (shea.hogan@cuanschutz.edu) and M. Kinney (mara.kinney@cuanschutz.edu) (Fall)
Prereq: Program consent (contact CLSC administrator for consent). This course will provide an overview of the field of ethics in clinical research. It is designed for investigators who will be conducting research involving human subjects. Participants will learn the historical background, current regulations, and IRB requirements related to human subjects protection issues. Hands-on experiences will be provided to participants to learn how to develop approaches to address conducting ethical human subjects' research in an optimal manner. In addition, participants will learn the essentials of responsible conduct of research.

CLSC 7152 Ethics and Responsible Conduct of Research in the Digital Age 1.0 cr.

Dr. W. Charles (wendy.charles@cuanschutz.edu) (Spring)
This course will provide an overview of the evolving ethical issues in clinical, translational and public health research involving digital data and technologies.

CLSC 7202 Clinical Outcomes and Applications 2.0 cr.

Drs. A. Keniston (angela.keniston@cuanschutz.edu); J. Boggs (jennifer.boggs@cuanschutz.edu); R. Kilian (rachel.kilian@ucdenver.edu) (Fall)
Prereq: (BIOS 6601 and BIOS 6602) or (BIOS 6611 and EPID 6630). For non-CLSC students, please seek consent of the instructor.
The Clinical Outcomes and Applications course introduces students to key concepts and methods in health outcomes research, focusing on how to measure, analyze, and apply outcomes data in research and health policy. Through a mix of lectures, case studies, and hands-on activities, students will learn to design research questions, evaluate study designs, and explore the real-world impact of outcomes research on healthcare delivery.

CLSC 7300 Scientific Grant Review Process: CCTSI Proposals – Doctoral 1.0 cr.

Drs. J. Maloney (james.maloney@cuanschutz.edu) (Spring)
Prereq: Completion of required core courses in biostatistics (BIOS 6601 and BIOS 6602 or BIOS 6611 and BIOS 6612).
Students will understand and participate in the process of scientific review of human subject research protocols submitted to the University of Colorado Denver Clinical Translational Research Centers at University Hospital and The Children's Hospital.

CLSC 7650 Guided Research Tutorial – Doctoral 1.0-3.0 cr.

Dr. L. Cicutto (lisa.cicutto@cuanschutz.edu) (Fall, Spring, Summer)
Prereq: Program consent (contact CLSC administrator for consent), approved course plan.
This is an independent study course developed by the student and appropriate faculty member based on the area of study. Students meet regularly with the selected course instructor. The student and course instructor will develop a course plan prior to registration of the course.

CLSC 7653 Dissemination and Implementation Research in Health 3.0 cr.

Drs. B. Rabin (borsika.rabin@cuanschutz.edu) and C. Studts (christina.studts@cuanschutz.edu) (Fall)
Prereq: Program consent (contact CLSC administrator for consent)
Introduces dissemination and implementation (D&I) research and practice in the context of health (i.e., translational research in health).

CLSC 7663 Context and Adaptation in Dissemination & Implementation Research 2.0 cr.

Drs. C. Studts (christina.studts@cuanschutz.edu) and B. Rabin (borsika.rabin@cuanschutz.edu) (Spring)
Prereq: CLSC 7653 Dissemination and Implementation Research in Health; Program consent (contact CLSC administrator for consent)
This course covers concepts, frameworks, and methods for understanding and assessing context and guiding adaptations as relevant to dissemination and implementation (D&I) health research and practice.

CLSC 8990 Doctoral Thesis 1.0-10.0 cr.

Dr. L. Cicutto (lisa.cicutto@cuanschutz.edu) (Fall, Spring, Summer)
Prereq: Program consent(contact CLSC administrator for consent)
This course involves the student working with his/her research mentor and research project committee to develop, design and execute a clinical science doctoral study as well as to write up the project as a thesis. This course is the capstone to the PhD degree. Work may be associated with preparing for the written and oral component of the thesis defense examination.

REQUIRED CORE COURSES

BIOS 6601 Applied Biostatistics I 3.0 cr.

Applied biostatistical methods including descriptive and statistical inference; odds ratio and relative risk, probability theory, parameter estimation, tests for comparing statistics of two or more groups, correlation and linear regression and overviews of: multiple and logistic regression and survival analysis.

BIOS 6602 Applied Biostatistics II 3.0 cr.

Prereq: BIOS 6601. A continuation of BIOS 6601 extending the basic principles of descriptive and inferential statistics to modeling more complex relationships using linear regression, logistic regression, and Cox regression. The statistical package SAS is used extensively. Multiple optional lab sessions offered.

BIOS 6623 Advanced Data Analysis 4.0 cr.

Prereq: BIOS 6601 and BIOS 6602 or BIOS 6611 and BIOS 6612 or permission of instructor.
This course teaches the students how to be effective collaborators. Students will learn to modify project hypotheses to be statistical hypotheses. The students will identify and perform the appropriate data analyses and communicate their analyses both verbally and in writing.

BIOS 6648 Design and Conduct of Clinical Research 3.0 cr.

Prereq: BIOS 6601 or BIOS 6611 or instructor permission. Design and conduct of clinical research studies. Intended for non-biostatistics students. Topics include specifying the research question, study endpoints, study populations, study interventions, sample size evaluation, and choice of comparison groups. Common study designs and methods for study conduct are described.

EPID 6626 Research Methods in Epidemiology 3.0 cr.

Prereq: BIOS 6601, EPID 6630 and either BIOS 6680 or EPID 6605 and EPID 6607.
Principles, concepts and methods for conducting ethical, valid and scientifically correct observational studies in epidemiological research are the focus of this class. Lectures and practical experience reinforce hypothesis formulation, study design, data collection and management, analysis and publication strategies.

EPID 6630 Epidemiology 3.0 cr.

This course provides an introduction to descriptive and analytic methods in epidemiology and their application to research, preventive medicine and public health practice.

EPID 6631 Analytical Epidemiology 3.0 cr.

Prereq: EPID 6630 and BIOS 6601 or BIOS 6611
This course will provide the fundamental analytical skills for assessing and reporting disease status, determinants of disease and their impact on public health. Students will learn methods of determining rates of disease occurrence, measures of associations between exposures and disease, and techniques for identifying and correcting for misclassification, effect modifiers and confounders. This is a skill-building course. BIOS 6680 OR both EPID 6605 and EPID 6607 are not a prerequisite but are strongly encouraged.

REQUIRED TRACK COURSES

HLTH 6071 Introduction to Health Information Technology 3.0 cr.

Examines what needs transforming in healthcare to improve value, safety, and appropriateness of care, and what the role of IT is in that transformation. IT also examines the challenges of cultural change and IT strategy in succeeding with clinical information projects. Differences between installation, implementation, transition and actual transformation are suggested, and methods for managing subcultures in healthcare (IT, clinical, administrative) are reviewed.

NURS 6286 Foundations Informatics 3.0 cr.

This introductory course focuses on core concepts, skills, tools that define the informatics field and the examination of health information technologies to promote safety, improve quality, foster consumer-centered care, and efficiency.

NURS 6290 Information Systems Life Cycle 4.0 cr.

Prereq: NURS 6286 with a B or better or permission of instructor.
This course focuses on a structured approach to information system, development, and implementation in healthcare settings. The course addresses the phases of the information systems life cycle.

NURS 6293 Database Management Systems 3.0 cr.

Dr. D. Skiba (diane.skiba@cuanschutz.edu) 303-724-8527
Prereq: NURS 6304 or permission of instructor.
An interdisciplinary course focused on design and application challenges in database management systems. Concepts of database modeling, querying, and reporting are explored. Students apply database concepts to clinical registries and Meaningful Use queries.

ADDITIONAL RESOURCES FOR COURSE INFORMATION

University of Colorado Denver Clinical Science Program
https://cctsi.cuanschutz.edu/training/clsc

Colorado School of Public Health
https://coloradosph.cuanschutz.edu/education

University of Colorado Denver School of Pharmacy
https://pharmacy.cuanschutz.edu/

University of Colorado Denver College of Nursing – Health Informatics
https://nursing.cuanschutz.edu/degrees-programs/graduate-programs/ms/hci

University of Colorado Physical Therapy Program
https://medschool.cuanschutz.edu/physical-therapy-program

University Colorado Denver Business School – Health Administration – Downtown Denver Campus
http://ucdenver.edu/academics/colleges/business/degrees/ms/health-admin/Pages/Degree-Requirements.aspx

University of Colorado Denver Anschutz Medical Campus – Graduate School
https://graduateschool.cuanschutz.edu/

University Colorado Denver Office of the Registrar – Anschutz Medical Campus
https://www.cuanschutz.edu/registrar

University of Colorado Denver Anschutz Campus Course Books and Descriptions
https://www.cuanschutz.edu/registrar/course-books

University of Colorado Jake Jabs Center for Entrepreneurship
https://jakejabscenter.org/