

# CLINICAL RESEARCH (CLH)

## School of Medicine

### CLH 200 – Introduction to Translational Research (1 unit)

*Course Description:* Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project.

*Prerequisite(s):* Consent of instructor; one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training programs.

*Learning Activities:* Lecture 1 hour(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

### CLH 201 – Strategies for Grant Writing (2 units)

*Course Description:* Practical skills and strategies to create successful grant proposals in NIH style/format. Generating ideas, identifying and accessing research resources, grant components, specific aims, background and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (Former MDS 461CR.)

*Prerequisite(s):* Consent of instructor; completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training program.

*Learning Activities:* Lecture 2 hour(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

### CLH 202 – Introduction to Clinical Research (3 units)

*Course Description:* Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs: cross-sectional, case-control, and cohort. Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research.

*Prerequisite(s):* Consent of instructor; completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, MRCTP program, Clinical Research Certificate or other SOM/CTSC training programs.

*Learning Activities:* Lecture 2 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

### CLH 203 – Methods in Clinical Research (2 units)

*Course Description:* Overview of major approaches to clinical research, including health services research techniques, informatics, GCRC, and preclinical methodologies to enhance clinical projects. Overview of UC Davis clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective.

*Prerequisite(s):* Consent of instructor; Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, TL1/T32, KL2/K12, MCRTTP, or other SOM training program.

*Learning Activities:* Lecture/Discussion 2 hour(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

### CLH 204 – The Ethics of Research (3 units)

*Course Description:* Ethical responsibilities, major questions in ethics, the role of trust in scientific research, and the application of ethical principles, concepts, and values.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Lecture/Discussion 3 hour(s).

*Enrollment Restriction(s):* Priority given to those with acceptance into the Clinical Research Graduate Group, K12, T32 or other SOM/CTSC training program.

*Grade Mode:* Letter.

### CLH 207 – Team Science (1 unit)

*Course Description:* Today's scientific challenges necessitate cross-disciplinary engagement and high collaboration levels. Offers guidance on how best to engage in team science to pursue complex questions, work effectively with team members, and produce high impact research that meets society's needs.

*Prerequisite(s):* Participation in CTSC Research Education and Training Programs, or consent of instructor.

*Learning Activities:* Lecture/Discussion 1 hour(s).

*Enrollment Restriction(s):* Restricted to 25 students.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### CLH 208 – Introduction to Grant Writing, I (2 units)

*Course Description:* First in a two-quarter series. Scholars are encouraged to enroll in both classes. The two-course sequence provides training in practical aspects of competitive grant writing. The focus is NIH, but information will apply to other funding agencies.

*Learning Activities:* Lecture/Discussion 2 hour(s), Extensive Writing.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### CLH 209 – Introduction to Grant Writing, II (2 units)

*Course Description:* Second in a two-quarter series. Two-course sequence provides training in practical aspects of competitive grant writing.

*Prerequisite(s):* CLH 208; consent of instructor.

*Learning Activities:* Lecture/Discussion 2 hour(s).

*Enrollment Restriction(s):* Restricted to students who have completed CLH 208.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### CLH 210Y – Principles & Methods of Comparative Effectiveness Research (4 units)

*Course Description:* Provides an introduction to Comparative Effectiveness Research (CER) and methods for conducting CER.

*Prerequisite(s):* Consent of instructor; familiarity with research methodology; course in introductory statistics.

*Learning Activities:* Web Virtual Lecture 4 hour(s), Discussion 2 hour(s), Project 6 hour(s).

*Grade Mode:* Letter.

### CLH 211 – Critical Assessment of the Biomedical Literature (1 unit)

*Course Description:* Exposure to topical issues and controversies in the design of interdisciplinary translational research, with an emphasis on critical assessment of the biomedical and health sciences literature. Extends students' knowledge of study design through practical application.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Lecture/Discussion 1 hour(s).

*Repeat Credit:* May be repeated 3 unit(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

**CLH 212 – Introduction to Stem Cell Biology (3 units)**

*Course Description:* Introduction to Stem Cell Biology. Each week will focus on different aspects of stem cells, including general concepts, stem cells in lower organisms, embryonic stem cells and cellular reprogramming.

*Learning Activities:* Lecture/Discussion 3 hour(s).

*Enrollment Restriction(s):* Open to graduate students with a fundamental knowledge of cell biology.

*Grade Mode:* Letter.

**CLH 214A – Biodesign I (2 units)**

*Course Description:* Focuses on the principles of needs identification and invention of biomedical technologies. Two part course provides a basic understanding of the elements of the innovation process and how to translate these principles into biomedical device design.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Lecture 2 hour(s).

*Enrollment Restriction(s):* Prior approval by instructor required; student must commit to taking both courses; Biodesign I and Biodesign II.

*Grade Mode:* Letter.

**CLH 214B – Biodesign II (2 units)**

*Course Description:* Focuses on the implementation of biomedical technologies and translational process. Two part course provides a basic understanding of the elements of the innovation process and how to translate these principles into biomedical device design.

*Prerequisite(s):* CLH 214A; consent of instructor.

*Learning Activities:* Lecture 2 hour(s).

*Enrollment Restriction(s):* Prior approval by instructor required; student must commit to taking both courses; Biodesign I and Biodesign II.

*Grade Mode:* Letter.

**CLH 215 – Clinical Trials in Medicine (2 units)**

*Course Description:* Importance, design, and execution of clinical trials.

*Prerequisite(s):* CLH 244 C or better; SPH 205AY C or better; or equivalent; or consent of instructor.

*Learning Activities:* Lecture/Discussion 2 hour(s).

*Grade Mode:* S/U only.

**CLH 217 – Healthcare Delivery Science – Implementing, Improving, & Disseminating Health Innovations (2 units)**

*Course Description:* Methods for moving evidence-based interventions into real-world settings. Strategies for communicating information on evidence-based interventions to health practitioners, improvements in healthcare delivery, and techniques to promote the systematic uptake of evidence-based practices into routine care to improve health outcomes.

*Learning Activities:* Lecture/Discussion 2 hour(s).

*Enrollment Restriction(s):* Restricted to students enrolled in master's programs in Clinical Research, Public Health, or Health Informatics at UC Davis, or scholars enrolled in a UC Davis CTSC training program.

*Grade Mode:* S/U only.

**CLH 220 – Basics of Stem & Progenitor Cells (1 unit)**

*Course Description:* Lecture designed for graduate students who have experience in cell culture techniques. Designed to give a broad overview of the field and current cells of interest to the greater research community.

*Prerequisite(s):* MCP 200L; MCP 200; consent of instructor; graduate standing.

*Learning Activities:* Lecture 1 hour(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

**CLH 222 – Ethical Issues in Stem Cell Biology (1 unit)**

*Course Description:* Critical presentation and analysis of recent articles in stem cell biology and small group discussions of the ethical issues surrounding this area of research.

*Prerequisite(s):* Consent of instructor; graduate standing.

*Learning Activities:* Lecture/Discussion 1 hour(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

**CLH 225 – Stem Cell Biology & current Good Manufacturing Practice (2 units)**

*Course Description:* Introduction to human stem cell biology; development of cellular therapeutics based on human stem cells for the treatment of currently incurable diseases; introduction to current Good Manufacturing Practice (cGMP), and theoretical & practical exploration of cGMP to manufacture such cellular therapies.

*Prerequisite(s):* Must have foundational knowledge of biology and chemistry; graduate students preferred, other students upon instructor's consent.

*Learning Activities:* Lecture/Discussion 2 hour(s), Laboratory 1 hour(s).

*Enrollment Restriction(s):* Graduate students preferred, other students upon instructor's consent.

*Grade Mode:* Letter.

**CLH 230 – Congestive Heart Failure, Mechanism of Disease (3 units)**

*Course Description:* Underlying mechanisms of cardiomyopathy and heart failure. Presentation of fundamental knowledge of and recent basic research on heart failure. Student team projects: investigation and presentation of a research topic and bench research project to advance research in the same area.

*Prerequisite(s):* Consent of instructor; graduate standing.

*Learning Activities:* Lecture/Discussion 2 hour(s), Project.

*Grade Mode:* Letter.

**CLH 231 – Current Techniques in Clinical Research (2 units)**

*Course Description:* Current techniques used in clinical research such as electrophysiology, cardiovascular surgery, cardiac catheterization and echocardiography, team science, and patient management. Lectures are presented by experts on each technique, with an emphasis on use in translational research.

*Prerequisite(s):* CLH 250; and consent of instructor; graduate standing.

*Learning Activities:* Lecture 1 hour(s), Clinical Activity 3 hour(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

**CLH 233 – Molecular Mechanisms of Disease: Cancer (3 units)**

*Course Description:* Cutting edge of research on underlying mechanisms of cancer development, progression and prevention; clinical trials/drug development, signaling pathways and molecular mechanisms of cancer development, recent basic research on cancer stem cells, genetics and epigenetic events and animal models used.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Lecture/Discussion 2 hour(s), Project 3 hour(s).

*Enrollment Restriction(s):* Restricted to students pursuing the designated emphasis in Translational Research; graduate standing.

*Grade Mode:* Letter.

## CLH 240 – Predoctoral Clinical Research Training Program Research Integration (1 unit)

*Course Description:* Alternating sessions: journal club, seminar/discussion, and research integration sessions.

*Prerequisite(s):* Consent of instructor; enrollment in the Predoctoral Clinical Research Training Program in the CTSC, School of Medicine.

*Learning Activities:* Seminar 0.50 hour(s), Discussion 0.50 hour(s).

*Repeat Credit:* May be repeated 3 time(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

## CLH 244 – Introduction to Medical Statistics (4 units)

*Course Description:* Introduction to statistical methods and software in clinical, laboratory, and population medicine. Graphical and tabular presentation of data; probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions; one and two sample t-test; elementary nonparametric methods; simple linear regression; and correlation.

*Prerequisite(s):* SPH 281; or ability to read a dataset such as a .csv file into SAS and to do data steps (label variables, format values, create new variables) and create summary measures (frequencies and means) in SAS.

*Learning Activities:* Lecture 4 hour(s).

*Cross Listing:* SPH 244.

*Grade Mode:* Letter.

## CLH 245 – Biostatistics for Biomedical Science (4 units)

*Course Description:* Analysis of data and design of experiments for laboratory data.

*Prerequisite(s):* CLH 244 or SPH 244; consent of instructor, or equivalent course.

*Learning Activities:* Lecture 4 hour(s).

*Cross Listing:* SPH 245.

*Grade Mode:* Letter.

## CLH 246 – Biostatistics for Clinical Research (4 units)

*Course Description:* Emphasizes critical biostatistics for clinical research and targets biomedical audience. Students will develop understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians.

*Prerequisite(s):* CLH 245 or SPH 245.

*Learning Activities:* Lecture 4 hour(s).

*Repeat Credit:* May be repeated.

*Cross Listing:* SPH 246.

*Grade Mode:* Letter.

## CLH 247 – Statistical Analysis for Laboratory Data (4 units)

*Course Description:* Statistical methods for experimental design and analysis of laboratory data including gene expression arrays, RNA-Seq, and mass spec.

*Prerequisite(s):* CLH 245 or SPH 245.

*Learning Activities:* Lecture 4 hour(s).

*Cross Listing:* SPH 247.

*Grade Mode:* Letter.

## CLH 250 – Integrating Medicine Into Basic Science (3 units)

*Course Description:* Immersive experience consisting of didactic lectures, reading assignments, group discussions, and clinical rotations to acculturate students to the human medical environment; integrate medical principles, physiology and pathophysiology into basic research; and introduce high-impact clinical studies related to medicine and health.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Lecture/Discussion 2 hour(s), Clinical Activity.

*Enrollment Restriction(s):* Graduate standing; priority given to students pursuing Designated Emphasis in Translational Research or CTSC TL1 training program.

*Grade Mode:* Satisfactory/Unsatisfactory only.

## CLH 290A – Hot Topics in Clinical Research (1 unit)

*Course Description:* Seminars presented by guest lecturers on subjects of their own research activities.

*Prerequisite(s):* Graduate standing or consent of instructor.

*Learning Activities:* Seminar 1 hour(s).

*Repeat Credit:* May be repeated.

*Grade Mode:* Satisfactory/Unsatisfactory only.

## CLH 290B – Hot Topics in Stem Cell Biology (1 unit)

*Course Description:* Seminars presented by guest lecturers on subjects of their own research.

*Prerequisite(s):* Consent of instructor; graduate standing.

*Learning Activities:* Seminar 1 hour(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

## CLH 290C – Literature in Stem Cell Biology (1 unit)

*Course Description:* Critical presentation and analysis of recent journal articles in stem cell biology by students.

*Prerequisite(s):* Consent of instructor; graduate standing.

*Learning Activities:* Discussion 1 hour(s).

*Repeat Credit:* May be repeated.

*Grade Mode:* Satisfactory/Unsatisfactory only.

## CLH 290D – Literature in Translational Research (1 unit)

*Course Description:* Critical presentation and analysis of recent journal articles in translational research by students.

*Prerequisite(s):* Consent of instructor; graduate standing.

*Learning Activities:* Discussion 1 hour(s).

*Repeat Credit:* May be repeated.

*Grade Mode:* Satisfactory/Unsatisfactory only.

## CLH 298 – Group Study in Clinical Research (1-5 units)

*Course Description:* Special topics in Clinical Research appropriate for group study at the graduate level.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Variable 3-15 hour(s).

*Enrollment Restriction(s):* Restricted to students enrolled in the Mentored Clinical Research Training Program.

*Repeat Credit:* May be repeated.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### **CLH 299 – Clinical Research (1-5 units)**

*Course Description:* Independent research and special topics in clinical research appropriate for graduate level.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Variable 3-15 hour(s).

*Enrollment Restriction(s):* Restricted to students enrolled in the Mentored Clinical Research Training Program.

*Repeat Credit:* May be repeated.

*Grade Mode:* Satisfactory/Unsatisfactory only.