THE OHIO STATE UNIVERSITY

CLINICAL AND TRANSLATIONAL
SCIENCE INSTITUTE

**Biomedical, Clinical and Translational Science Interdisciplinary Specialization:
Program Description and Course Options**

The goal of the Biomedical, Clinical and Translational Science Interdisciplinary Specialization (BIOMCLT-IS) is to prepare graduate and professional students to be actively engaged in the field of clinical and translational science through academic training and research.

As defined by The Ohio State University Graduate School, a graduate interdisciplinary specialization (GIS) involves two or more graduate programs outside the student's home program. Completion of a GIS is noted on the student's transcript.

The core course in this program focuses on the basic components of clinical and translational science, while the electives allow students to pursue topics across the other health sciences colleges for an interdisciplinary experience.

As a result of participation in the program, it is expected that students will:

- develop skills in designing clinical and translational research studies;
- apply statistical procedures to clinical and translational research problems;
- develop skills for the communication of the scientific concepts and research questions in one's own discipline to experts in other disciplines and to the public at large;
- understand how to involve the community in clinical and translational research; and
- build interdisciplinary/intradisciplinary/multidisciplinary teams to study clinical and translational research issues.

Application deadline: Applications will be accepted on a rolling basis.

Curriculum Requirements

- The BIOMCLT-IS requires a minimum of five courses.
  - All students enrolled in the BIOMCLT-IS must take PUBHEPI 6412 Conducting and Communicating Research in Clinical and Translational Science. This is a 2-credit hour course offered each autumn semester by the College of Public Health. It is recommended, but not required, that this course be taken first.
  - Students must take at least one course from each of the four Core Competency Clusters. The Competency Clusters are based on the National Center for Research Resources (NCRR) Core Competencies for Clinical and Translational Research. There are a total of 14 competencies that have been grouped together to form four clusters.
- Most of the participating colleges have internal procedures that are required to enroll in their courses, such as contacting the instructor. For most of these courses you will need to talk to the instructor before enrolling. All these courses have been approved by their department and/or college for inclusion in the BIOMCLT-IS.

Specialization Guidelines

- Per graduate school guidelines, the BIOMCLT-IS require a minimum of 10 and no more than 20 semester credit hours of graduate level coursework.
- A graduate interdisciplinary specialization involves two or more graduate programs outside the student's home program. Nine credit hours must be taken outside of the student's home program in at least three courses and at least two other programs. Thus, if you are a BSGP student, you must select at least three courses from the BIOMCLT-IS course menu that come from outside that curriculum. These courses can come from other programs in the College of Medicine or from other colleges.
- Credit hours can include work already required as part of the student's degree program.
- If there is a course that fits the competencies but is not listed here, it is possible to substitute it for a listed course. Contact the BIOMCLT-IS program administrator for more information.
- Apply for the Specialization through OSU Graduate School at this address: https://gradsch.osu.edu/future-students/find-your-program/graduate-minors-interdisciplinary-specializations-and-graduate-0
- When the student has completed the GIS program, the student must complete the GIS transcript designation form in GRADFORMS for final review. Once reviewed and approved by the GIS program and the Graduate School, the designation will be posted to the student's academic record. See the above link for more information.

Questions? Contact the BIOMCLT-IS program manager at Stuart.Hobbs@osumc.edu or 614-685-5972

The Core Competencies

In 2008, The National Center for Research Resources and the Clinical and Translational Science Award (CTSA) Education and Career Development Steering Committee developed national standards for core credentialing competencies for clinical and translational science. The overall goal was to create a competency-based education for training clinician-scientists that will define the discipline of Clinical and Translational Science.

The Ohio State University Clinical and Translational Science Institute (CTSI) uses these Core Competencies to develop its foundation courses as well as evaluate trainees. There are a total of 14 competencies that have been grouped together to form four clusters.

Research Methods
- Identify major clinical/public health problems and relevant translational research questions
- Identify, interpret and critique literature and assess the state of knowledge regarding a problem
- Know how to design a study protocol for clinical and translational research
- Understand study methods, design and implementation
- Use appropriate laboratory, clinical and population research methods
- Understand the principles of the conduct of responsible research

Analysis, Statistics and Informatics
- Be able to use appropriate statistical methods and conduct relevant analysis
- Describe and make use of best practices for managing, protecting and analyzing biomedical and health information

Community and Communications
- Understand the principles of community engagement in clinical and translational research
- Navigate competently among divers populations and cultures
- Be able to communicate scientific findings to your peers and to disseminate scientific knowledge to those outside your field, including other scientists, university administrators, policy makers and the public

Leadership and Training
- Participate in cross-disciplinary training and mentoring
- Demonstrate leadership and professionalism
- Engage in translational teamwork

BIOMCLT-IS COURSE OPTIONS

All students take the core course: PUBHEPI 6412: Basic Principles in Clinical and Translational Science (2 credits). Then students take at least one course from each of the four Core Competencies

Research Methods	Analysis, Statistics and Informatics	Community and Communication	Leadership and Training
BSGP 8050: Research Techniques and Resources (4 credits)	PUBHBIO 6210 - Applied Biostatistics I (3 credits) DL	BSGP 7070: Fundamentals of Grant Writing I (4 credits)	EEOB 5510: Interdisciplinary Team Science (3 credits)
MCR 7782 Clinical Research Design and Methods. (3 credits) DL	PUBHBIO 6211 - Applied Biostatistics II (3 credits) DL	BSGP 7080: Fundamentals of Grant Writing II (2 credits)	HTHRHSC 7300: Management and Leadership in Health Sciences (3 credits)
PUBHEPI 7412: Principles and Procedures for Human Clinical Trials (3 credits)	PSYCH 6810: Statistical Methods in Psychology I (4 credits)	Nursing 6110: Health Literacy (2 credits)	HTHRHSC 7350: Issues and Policy in Health Sciences (3 credits)
PUBHHBP 7534: Research Methods in Health Behavior and Health Promotion (3 credits)	PSYCH 6811: Statistical Methods in Psychology II (4 credits)	PUBHHBP 7520: Community Health Assessment (2 credits)	MCR 7404: Project Management for Healthcare and Clinical Research (3 credits) DL
HTHRHSC 7574: Mixed Methods Approaches for Policy-Related Research (3 credits)	STAT 5301: Intermediate Data Analysis I (4 credits)	PUBHHBP 6535: Community Engagement and Collaborative Community Problem-Solving (3 credits) DL	PHR 5560: Success and Leadership in Pharmacy (1.5 credits)
SOCWORK 8406: Mixed Methods Research in Social and Health Sciences (3 credits) DE	STAT 5302: Intermediate Data Analysis II (3 credits)	PUBHEPI 6413: Conducting and Communicating Research in Clinical and Translational Science (2 credits)	PUBHHBP 6558: Policy as a Prevention Strategy (2 credits)
PUBHBIO 7215: Design and Analysis of Clinical Trials (2 credits) DL	VETCLIN 8783: Experimental Design and Data Analysis in Veterinary and Comparative Medicine I (1 credit)	VETCLIN 8781 Research Methods and Grantsmanship (1 credit)	PUBHHMP 7617: Health Services Leadership and Organizational Change (3 credits)
PUBHHBP 7522: Program Planning and Implementation (3 credits)	VETCLIN 8784: Experimental Design and Data Analysis in Veterinary and Comparative Medicine II (1 credit)	VISSCI 7940: Oral Presentation of Scientific Research (1-3 credits)	PUBAFRS 6000: Public Policy Formulation and Implementation (4 credits) DL
PUBHHMP 8671: Health Care Outcomes Measurement (2 credits)	PUBHBIO 5280: Introduction to Genomic Data Analysis (3 credits)	VISSCI 7970: Grantsmanship (2 credits)	PUBAFRS 7572: Policy Simulation and Modeling (3 credits)
HTHRHSC 7883: Responsible Conduct of Research (3 credits)	BMI 5710: Introduction to Biomedical Informatics (3 credits) DL		
PHR 8520: Research Ethics (1 credit)	BMI 5750: Methods in Biomedical Informatics (3 credits) DL		
VISSCI 7960: Ethics in Biomedical Research (2 credits)	**Research Methods, cont.**		
	GRADSCH 8000: Responsible Conduct of Research (1 credit)		
NURSING 7781: Responsible Conduct of Research. (3 credits) DL	BMI 8150: Rigorous and Reproducible Design and Data Analysis (3 credits) Can be used either for Methods or Analysis		

**Advising Sheet for Biomedical, Clinical and Translational Science
Interdisciplinary Specialization**

This document will enable you to identify the courses that will fulfill the thematic requirements of the BCTS-IS and meet the interdisciplinary requirements from the Graduate School for Interdisciplinary Specializations.

Courses for the BCTS-IS

Core Course	Program	Credits
PUPHEPI 6412	Public Health - epidemiology	2

Thematic Track	Course to Fulfill	Program	Credits
Research Methods Track			
Analysis, Statistics and Informatics Track			
Community and Communication Track			
Leadership and Training Track			

IS Guidelines from Graduate School:	TOTAL
10 to no more than 20 hours:	
Two or more grad programs outside home program	
9 credit hours outside home program . . .	
. . . in at least 3 courses	

Course Descriptions

Core Course:

College of Public Health – Epidemiology

PUBHEPI 6412: Basic Principles in Clinical and Translational Science
> Identification of clinical and translational research issues, assessment of the literature, ethically responsible research, cross-disciplinary training and mentoring. 2 credits.

Other Courses to Select From:

College of Arts and Sciences

EEOB 5510: Interdisciplinary Team Science
> Funding agencies worldwide are placing greater emphasis on interdisciplinary research. For example, the NSF has identified "Growing Convergence Research" as one of its 10 Big Ideas. True convergence research requires the development of interdisciplinary scientific teams (groups of two or more working collaboratively to solve a problem). However, graduate students are often siloed within programs, and not necessarily trained to engage with others outside their field. This course aims to teach students the necessary skills to lead or participate in scientific or interdisciplinary teams. 3 credits.

Graduate School

Graduate School 8000: Responsible Conduct of Research (Course ID 37106)
> This course was specifically designed to meet NIH requirements in RCR training. The course provides a practical overview of the rules, regulations and professional practices that define the responsible conduct of research. Covers all the topics required by the National Institutes of Health. The course features weekly facilitated discussions from experts across campus. 1 Credit. Offered Spring term. Registration through BuckeyeLink.

College of Medicine

School of Health and Rehabilitation Sciences

HTHRHSC 7300: Management and Leadership in Health Sciences
> Application of management and leadership principles for the development of administration of allied health departments in the health care system. 3 credits

HTHRHSC 7350: Issues and Policy in Health Sciences
> Allied health professionals must increasingly face many complex issues that affect healthcare. It is crucial that graduate students be able to critically examine a broad range of issues and understand various positions and their implications. 3 credits

HTHRHSC 7883: Responsible Conduct of Research
> An exploration of the complications in conducting scientific research. Topics include authorship, human and animal subjects training, data acquisition and ownership and conflicts of interest. 3 credits.

HTHRHSC 7574: Mixed Methods Approaches for Policy-Related Research
> Evaluate the strengths and weaknesses of various mixed method research designs and how to identify a design that is appropriate for your research question. The course will compare different paradigms, sample/case selection logics and types of evaluation associated with qualitative, quantitative and mixed methods research. Cross-listed in PubAfrs. 7574. 3 credits.

Biomedical Science Graduate Program

BSGP 7070: Fundamentals of Grant Writing I
> Introduce students to the basic principles of grant writing. 4 credits.

BSGP 7080: Fundamentals of Grant Writing II
> Introduce students to principles of grant writing. Students will also write their own grants in the style of NIH submissions. Students will also learn about the grant review process. 2 credits.

BSGP 8050: Research Techniques and Resources
> Survey of research techniques used to solve problems in modern cell and molecular biology, immunology, biochemistry, microbiology, microscopy, laboratory safety and related available resources. 4 credits.

Biomedical Informatics

BMI 5710: Introduction to Biomedical Informatics
> A survey of biomedical informatics theories and methods employed in the design, implementation and management of information systems supporting basic science, clinical and translational research, clinical care and public health. Recommended course work in computer science, statistics, anatomy, physiology and medical terminology. Distance Learning. 3 credits.

BMI 5750: Methods in Biomedical Informatics
> An intensive, application-oriented survey of methods used during the course of the design, implementation and evaluation of BMI platforms, including clinical info systems, decision support systems, databases, electronic data capture instruments, data visualization tools and other analytical "pipelines". These methods span a broad spectrum from information needs assessments to systems evaluation. Prereq: Basic knowledge of the following areas - basic computer science principles (logic, procedural and/or object-oriented programming, data structures and algorithms), statistical methods and medical terminology. Distance Learning. 3 credits.

BMI 8150: Rigorous and Reproducible Design and Data Analysis
> Students will learn to: computationally analyze datasets using best practices in experimental design and analysis; use the R language to analyze datasets from transcriptome, genome and clinical studies; use examples from experimental design literature that are rigorous and with built-in flaws; identify sources of bias and the impact these have on results/conclusions. This course is graded S/U. 3 credits. Can be used for credit in Research Methods track or Analysis, Statistics and Informatics track, but not both.

College of Nursing

NURSING 6110: Health Literacy
    Examination and analysis of issues of low health literacy, including populations at risk, research, measurement tools, writing in plain language; health communication techniques; and organizational approaches. 2 credits.

MCR 7404: Project Management for Healthcare and Clinical Research
    Principles of project management, strategic planning and leadership in healthcare, clinical research and regulatory settings. Distance Learning. 3 credits. Summer.

Nursing 7781: Responsible Conduct of Research
    Concepts and policies for the responsible conduct of research (RCOR), Institutional Review Boards and dissemination of findings. Distance Learning, face-to-face as needed. 3 credits Autumn/Spring.

MCR 7782: Clinical Research Design and Methods
    Study of research design and methods used in clinical and preclinical research. Measurement issues, bias and confounding, statistical considerations, evaluation of published clinical and preclinical research designs and protocol and proposal development. Autumn/Spring. Distance Learning. 3 credits.

College of Pharmacy

PHR 5560: Success and Leadership in Pharmacy
    Explore the meaning of success and leadership, attributes of successful leaders and what can be done to be a successful leader. 1.5 credits.

PHR 8520 – Research Ethics
    Basic concepts of integrity in the process of research. The course fulfills NIH requirement for research ethics. 1 credit.

College of Public Health – Biostatistics

PUBHBIO 5280: Introduction to Genomic Data Analysis
    Provides an in-depth analysis of a specific question to which genomic methods are applied. Intersperses experimental methods and statistical analysis of biological data. Some experience with programming is recommended. 3 credits.

PUBHBIO 6210: Applied Biostatistics I
    Theory and application of basic statistical concepts for design of studies in health sciences, integrated with statistical software applications. Distance Learning. 3 credits.

PUBHBIO 6211: Applied Biostatistics II
    A second course in applied biostatistical methods with an emphasis on regression methods commonly used in the health sciences. The focus is on linear regression and ANOVA. Integrated with the use of computer statistical packages. Distance Learning. 3 credits.

PUBHBIO 7215: Design and Analysis of Clinical Trials
> Design, monitoring and analysis of clinical trials; includes protocol development, randomization schemes, sample size methods and ethical issues. Distance Learning. 2 credits.

College of Public Health – Epidemiology

PUBHEPI 6412: Basic Principles in Clinical and Translational Science
> Identification of clinical and translational research issues, assessment of the literature, ethically responsible research, cross-disciplinary training and mentoring. 2 credits.

PUBHEPI 6413: Conducting and Communicating Research in Clinical and Translational Science
> Design and writing of protocol, study methods and implementation, community engagement, informatics and translational teamwork. Scientific communication skills and dissemination of clinical and translational science. 2 credits.

PUBHEPI 7412: Principles and Procedures for Human Clinical Trials
> Principles and procedures for clinical professionals in the design, conduct and analysis of human clinical trials. 3 credits.

College of Public Health – Health Behavior and Health Promotion

PUBHHBP 6535: Community Engagement and Collaborative Community Problem-Solving
> This class provides the opportunity to review several concepts critical to collaborative community problem-solving. A broad range of literature will be reviewed, and students will have the opportunity to experience several simulated processes unique to the collaborative problem-solving process. Distance Learning. 3 credits.

PUBHHBP 7520: Community Health Assessment
> Models of community health assessment; skills in identifying, analyzing and integrating information concerning community resources and needs. 2 credits.

PUBHHBP 7522: Program Planning and Implementation
> Planning and implementation of programs to address public health issues in defined populations; development of a health promotion program for a specific community partner. 3 credits

PUBHHBP 7534: Research Methods in Health Behavior and Health Promotion
> Social science research methods emphasizing methods used to assess the dimensions of health-relevant behaviors and community-based prevention research. 3 credits.

PUBHHBP 6558: Policy as a Prevention Strategy
> This course will prepare graduate students on the key elements of how policy can be used as an intervention to promote primary, secondary and tertiary prevention. Course activities will build skills for the evaluation of when policy is an appropriate strategy, and how to prepare a policy brief on a formal policy issue that impacts population health. 2 credits.

College of Public Health – Health Services Management and Policy

PUBHHMP 7617: Health Services Leadership and Organizational Change
> Overview of leadership and organizational change theories, as well as the application of those theories to case studies in health sector organizations. 3 credits

PUBHHMP 8671: Health Care Outcomes Measurement
> Evaluation of specific techniques for measuring outcomes in clinical and health services research studies. 2 credits.

John Glenn School of Public Affairs

PUBAFRS 6000: Public Policy Formulation and Implementation
> Overview of the public policy process and the historical and contemporary context in which policy making and implementation are carried out in the United States at the federal, state and local levels. Distance Learning. 4 credits.

PUBAFRS 7572: Policy Simulation and Modeling
> Introduction to the development of conceptual and data models for public policy analysis including hands-on experience with using simulations tools for agent-based and system dynamics modeling. 3 credits.

Psychology

PSYCH 6810: Statistical Methods in Psychology I
> Basic concepts of descriptive and inferential statistics; includes estimation, hypothesis testing, non-parametric techniques and analysis of variance. 4 credits.

PSYCH 6811: Statistical Methods in Psychology II
> Simple linear regression and correlation, multiple linear regression, interactions; introduction to other related methods such as nonlinear regression and random effects models. 4 credits.

College of Social Work

SOCWORK 8406: Mixed Methods Research in Social and Health Sciences
> Course provides an overview of mixed methods approaches, with an emphasis on application to social and health sciences research. Discusses the history and philosophy underlying mixed methods research with a focus on the epistemological underpinnings of mixed methods designs and their components. Research traditions incorporated under the umbrellas of quantitative/qualitative methods are considered. 3 credits.

Statistics

STAT 5301: Intermediate Data Analysis I
> The first course in a two-semester non-calculus sequence in data analysis covering descriptive statistics, design of experiments, probability, statistical inference, one-sample t, goodness of fit, two sample problem and one-way ANOVA. 4 credits.

<u>STAT 8783: Intermediate Data Analysis II</u>
>The second course in a two-semester sequence in data analysis covering simple linear regression (inference, model diagnostics), multiple regression models, variable selection, model selection, two-way ANOVA, mixed effects model. 3 credits.

College of Veterinary Medicine

<u>VETCLIN 8781: Research Methods and Grantsmanship</u>
>Introduction to grantsmanship, including the development of a research question, use of appropriate statistical methods and the preparation of a research proposal that will be reviewed by the class.1 credit.

<u>VETCLIN 8783: Experimental Design and Data Analysis in Veterinary and Comparative Medicine I</u>
>Principles and practice of study designs and data analyses commonly used in veterinary and comparative medical research. 1 credit.

<u>VETCLIN 8784: Experimental Design and Data Analysis in Veterinary and Comparative Medicine II</u>
>Introduction to the principles and practice of study designs and data analyses commonly used in veterinary and comparative medical research. 1 credit.

Vision Science

<u>VISSCI 7960: Ethics in Biomedical Research</u>
>Provides a general understanding of the issues surrounding the ethical conduct of science including issues related to research involving human subjects, scientific misconduct and authorship of scientific papers. Real-life case studies will be used. 2credits.

<u>VISSCI 7970: Grantsmanship</u>
>The structure of the National Institutes of Health, the principles of good grantsmanship and description of the grant review process. Emphasis focused on Mentored Clinical Scientist Development Award (K23) and Research Project Grant (R01). 2 credits.

<u>VISSCI 7940: Oral Presentation of Scientific Research</u>
>Student gives a talk based on his/her research or scholarship and improves his/her speaking skills. 1-3 credits.