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 two 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.

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 Ohio State Graduate School at this address: https://gradsch.osu.edu/future-students/find-your-program
- 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 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 6280: Practical Biostatistics for Biomedical Laboratory Researchers	HTHRHSC 7888: Health and Rehabilitation Science Grand Rounds Intro (1 credit)	NURSING 7404: Project Management for Healthcare and Clinical Research ONLINE (3 credits)

	(3 credits)		
NURSING 8780: Research Methods I (3 credits)	PUBHBIO 6210: Design and Analysis of Studies in the Health Sciences I (ONLINE available) (3 credits)	BSGP 7070: Fundamentals of Grant Writing I (4 credits)	NRSPRCT 8400: Leadership Throughout Organizations and Systems (3 credits)
NURSING 7781: Responsible Conduct of Research. ONLINE (3 credits)	PUBHBIO 6211: Design and Analysis of Studies in the Health Sciences II (3 credits)	BSGP 7080: Fundamentals of Grant Writing II (2 credits)	NRSPRCT 8401: Strategic Macrosystem Management for the Doctor of Nursing Practice (3 credits)
NURSING/PHARMACY 7782 Clinical Research Design and Methods. ONLINE (3 credits)	PUBHBIO 7245: Biostatistical Collaboration (2 credits)	Nursing 6110: Health Literacy (2 credits)	HTHRHSC 7300: Management and Leadership in Health Sciences (3 credits)
NRSPRCT 8780: Clinical Effectiveness and Translation in Clinical Science (3 credits)	PSYCH 6810: Statistical Methods in Psychology I (4 credits)	PUBHHBP 7520: Community Health Assessment (2 credits)	HTHRHSC 7350: Issues and Policy in Health Sciences (3 credits)
PUBHEPI 7412: Principles and Procedures for Human Clinical Trials (3 credits)	PSYCH 6811: Statistical Methods in Psychology II (4 credits)	PUBHHBP 7544: Fundamental Determinants of Population Health and Implications for Public Health (3 credits)	PHR 5560: Success and Leadership in Pharmacy (1.5 credits)
PUBHHBP 7532: Program Evaluation in Public Health (3 credits)	STAT 5301: Intermediate Data Analysis I (4 credits)	PUBHHBP 7558: Social Ecological Strategies in Prevention (2 credits)	PUBHHMP 7617: Health Services Leadership and Organizational Change (3 credits)
PUBHHBP 7534: Research Methods in Health Behavior and	STAT 5302: Intermediate Data Analysis II (3 credits)	PUBHEPI 6413: Conducting and Communicating Research in	PUBAFRS 6000: Public Policy Formulation and Implementation (4 credits)

Health Promotion (3 credits)		Clinical and Translational Science (2 credits)	
PUBHHBP 7522: Program Planning and Implementation (3 credits)	VETCLIN 8783: Experimental Design and Data Analysis in Veterinary and Comparative Medicine I (1 credit)	VISSCI 7940: Oral Presentation of Scientific Research (1-3 credits)	
PUBHHMP 8671: Health Care Outcomes Measurement (2 credits)	VETCLIN 8784: Experimental Design and Data Analysis in Veterinary and Comparative Medicine II (1 credit)	VISSCI 7970: Grantsmanship (2 credits)	
PUBHHMP 7678: Approaches to Health Services Research (3 credits)	BMI 5710: Introduction to Biomedical Informatics (3 credits)	VETCLIN 8781 Research Methods and Grantsmanship (1 credit)	
VISSCI 7960: Ethics in Biomedical Research (2 credits)	BMI 5750: Methods in Biomedical Informatics (3 credits)		
PHR 8520: Research Ethics (1 credit)	BMI 8150: Rigorous and Reproducible Design and Data Analysis (3 credits) Can be used either for Methods or Analysis		

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 units.

Other Courses to Select From:

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 units

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 units

HTHRHSC 7888: Health and Rehabilitation Science Grand Rounds Intro

Students develop skills in analyzing, discussing and synthesizing health and rehabilitation research. Students present their own research and critically appraise faculty research. Discussion and demonstration of leadership will occur. 1 unit.

Biomedical Science Graduate Program

BSGP 7070: Fundamentals of Grant Writing I

Introduce students to the basic principles of grant writing. 4 units.

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 units

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 units.

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. (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. Prerequisite: 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. (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 Practice

NRSPRCT 8400: Leadership Throughout Organizations and Systems

Socialization to leadership and excellence in multiple dimensions of the Doctor of Nursing Practice role. 3 units

NRSPRCT 8401: Strategic Macrosystem Management for the Doctor of Nursing Practice

Integration of theoretical, leadership and communication principles into strategic management strategies for evidence based, innovative macro system health care optimization for selected populations. 3 units

NRSPRCT 8780: Clinical Effectiveness and Translation in Clinical Science

Theoretical underpinnings of nursing knowledge and critical appraisal of clinically relevant research related to clinical effectiveness and translational science concepts. 3 units.

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 units.

Nursing 7404: Project Management for Healthcare and Clinical Research

Principles of project management, strategic planning and leadership in healthcare, clinical research and regulatory settings. 3 credits. Summer. ONLINE

Nursing 7781: Responsible Conduct of Research

Concepts and policies for the responsible conduct of research (RCOR), Institutional Review Boards and dissemination of findings. 3 credits Autumn/Spring. ONLINE, face-to-face as needed

Nursing/Pharmacy 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. 3 credits. Autumn/Spring. ONLINE

NURSING 8780: Research Methods I

Survey of quantitative design and measurement approaches relevant to nursing and health. Emphasis is placed on experimental designs and measurement in nursing and health research. 3 units.

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 units

PHR 8520 – Research Ethics

Basic concepts of integrity in the process of research. The course fulfills NIH requirement for research ethics. 1 unit.

Pharmacy/Nursing 7782 Research Design and Methods for Clinical and Preclinical Research

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. 3 credits. Autumn/Spring. ONLINE

College of Public Health – Biostatistics

PUBHBIO 6210: Design and Analysis of Studies in the Health Sciences I

Theory and application of basic statistical concepts for design of studies in health sciences, integrated with statistical software applications. In class and online sections available. 3 units.

PUBHBIO 6211: Design and Analysis of Studies in the Health Sciences 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. 3 units.

PUBHBIO 6280: Practical Biostatistics for Biomedical Laboratory Researchers

Introduction to statistical principles and methods appropriate for experimental laboratory data with applications in biomedical sciences. 3 units

PUBHBIO 7245: Biostatistical Collaboration

Basic biomedical research methodologies: collaborate with biomedical researchers to design experiments and plan analyses; protocol preparation; professional skills development; statistical report preparation. 2 units.

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 units.

PUBHEPI 6413: Conducting and Communicating Research in Clinical and Translational Science

Design and writing of protocol, study methods and implementation, community engagement, informatics, translational teamwork. Scientific communication skills and dissemination of clinical and translational science. 2 units.

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 units.

College of Public Health – Health Behavior and Health Promotion

PUBHHBP 7520: Community Health Assessment

Models of community health assessment; skills in identifying, analyzing and integrating information concerning community resources and needs. 2 units.

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 units

PUBHHBP 7532: Program Evaluation in Public Health

Examination of evaluation models for public health programs; exploration of philosophical and scientific issues in evaluation; and skill building in both qualitative and quantitative evaluation methods. 3 units.

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 units.

PUBHHBP 7544: Fundamental Determinants of Population Health and Implications for Public Health

Presents the ideas that population health is determined by factors outside of health care and individual behavior occurs within a social context. 3 units.

PUBHHBP 7558: Social-Ecological Strategies in Prevention

Community health promotion strategies using policy, systems and environmental change perspectives. 2 units

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 units

PUBHHMP 7678: Approaches to Health Services Research

Overview of the field of health services research and the role of health services research in improving health care delivery. 3 units.

PUBHHMP 8671: Health Care Outcomes Measurement

Evaluation of specific techniques for measuring outcomes in clinical and health services research studies. 2 units.

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. 4 units.

Psychology

PSYCH 6810: Statistical Methods in Psychology I

Basic concepts of descriptive and inferential statistics; includes estimation, hypothesis testing, nonparametric techniques and analysis of variance. 4 units.

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 units.

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 units.

STAT 5302: Intermediate Data Analysis II

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 units.

College of Veterinary Medicine

VETCLIN 8781: Research Methods and Grantsmanship

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 unit.

VETCLIN 8783: Experimental Design and Data Analysis in Veterinary and Comparative Medicine I

Principles and practice of study designs and data analyses commonly used in veterinary and comparative medical research. 1 unit.

VETCLIN 8784: Experimental Design and Data Analysis in Veterinary and Comparative Medicine II

Introduction to the principles and practice of study designs and data analyses commonly used in veterinary and comparative medical research. 1 unit.

Vision Science

VISSCI 7960: Ethics in Biomedical Research

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. 2 units.

VISSCI 7970: Grantsmanship

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 units.

VISSCI 7940: Oral Presentation of Scientific Research

Student gives a talk based on his/her research or scholarship and improves his/her speaking skills. 1-3 units.