A common longitudinal intensive care unit data format (CLIF) for critical illness research
Faculty Mentor: Dr. Patrick Lyons
Critical illness threatens millions of lives annually. Electronic health record (EHR) data are a source of granular information that could generate crucial insights into the nature and optimal treatment of critical illness. The multi-center Common Longitudinal ICU data Format (CLIF) project aims to overcome key EHR data standardization, management, and security, barriers to large-scale critical illness EHR studies. Depending on the intern's skill set and interest, they may help with consensus-based data element standardization, development of internal validation and quality assessment tools, or a disease-focused subproject.

AI for Cancer Imaging
Faculty Mentor: Dr. Xubo Song
Our group focuses on applying artificial intelligence to cancer imaging, to better understand how cancer develop and evolve, and for precision early cancer detection and precision treatment. Example projects include applying machine learning and generative AI models for data harmonization, domain adaptation, image super-resolution, image denoising, cross-modal translation, multimodal integration, image segmentation, representation learning, spatial and dynamics modeling. There are multiple imaging modalities including histopathology, immuno-fluorescent imaging, electron microscopy, and radiological images. The approaches include convolutional neural networks, transformers, diffusion models, variational autoencoders, graph models, foundation models and multimodal large language models. Students familiar with programming and knowledge/experience with machine learning are preferred.

Implementing an Electronic Care Plan for People with Multiple Chronic Conditions – eCarePlan
Faculty Mentor: Dr. David Dorr
This related set of projects project intends to understand how to share health and safety information by implementing the eCarePlan application (presented to the patient as "MyCarePlanner" and to the clinical team as "eCarePlanner") in clinical care. The application uses Fast Healthcare Interoperable Resources (FHIR) to pull multiple sources of data in order to prioritize, summarize and display the health information for care coordination and care planning. Use of the application focuses on older adults with multiple chronic conditions (MC COMPARE project) and behavioral health conditions and settings (BH eCP project). We also are adding clinical decision support, AI summarization capabilities, and the like. Clinicians and patients are participating in training, interviews, surveys and implementation support to use the applications. The intern will help with data evaluation, including collating data from multiple data sources and natural language processing to evaluate PDFs and unstructured notes. Background in biostatistics may be helpful.

Leveraging AI/LLMs for Automatic Pathway Annotation and Analysis
Faculty Mentor: Dr. Guanming Wu
Reactome is one of the most comprehensive open-source biological pathway knowledge bases and is widely used by the research community for large-scale data analysis and visualization. Its content is manually curated from the biomedical literature to ensure accuracy, but this process is time-consuming. This project aims to develop and enhance multi-agent AI workflows to automatically extract biochemical reactions from biomedical literature according to the Reactome data model. We will also explore AI-assisted workflows for analyzing single-cell omics datasets using Reactome. A background in biology is required, and experience with Python programming, machine learning, or large language models (LLMs) is advantageous.

ADHD Risk Prediction Faculty

Faculty Mentor: Dr. Michael Mooney

Neurodevelopmental conditions, like attention-deficit hyperactivity disorder (ADHD), are influenced by a complex interplay between multiple genetic and environmental factors. Our work aims to better understand individual risk factors and how they jointly contribute to the course of ADHD-related traits and outcomes over time. Internship projects involve examining relationships between genomic/epigenomic factors, environmental exposures, and behavioral measures in longitudinal data sets to aid the development of risk prediction models. Experience with programming and statistical analysis in R or Python is recommended.

Center for AI-enabled Learning Health Science

Faculty Mentors: Dr. David Dorr and Dr. Jeff Gold

The Center focuses on assessment and evaluation of key problems that face our health care system, including access to care, patient engagement, quality, safety, care team engagement and satisfaction, and equity, and have built a virtuous learning system to quickly prototype and implement solutions, largely focused on AI. The intern will help with a variety of projects, including a set of clinical and pragmatic trials and have access to an advanced AI ecosystem.

Understanding the Human Microbiome

Faculty Mentor: Dr. Lisa Karstens

Humans live in a symbiotic relationship with hundreds of microorganisms. These bacteria, fungi, and viruses that make up the human microbiome are essential for understanding human health and, more importantly, disease. To study the human microbiome, researchers often generate large datasets containing sequencing or metabolic information that is then associated with clinical and demographical information to address a clinical question. Intern projects include developing, testing, and improving the pipelines for handling these data for a variety of projects investigating the microbiome's role in relation to human disease, including bladder disorders, rheumatic disease, and cancer. Data include survey and questionnaire data from REDCap, 16S rRNA gene sequencing data, and metabolomics data. The projects will provide experience of analysis and biological interpretation of so-called 'big data' that arises from the rich and complex datasets generated by high throughput techniques used in basic research. Excellent record-keeping skills and self-motivation are essential. Some familiarity with programming and statistical analysis in R are preferred but not essential.

Land Ho! Mapping clinical informatics competencies by navigating OHSU courses - it's not quite Magellan's voyage, but it is a journey of discovery especially if you are interested in pursuing a career in clinical informatics.

Faculty Mentor: Dr. Vishnu Mohan

Our core clinical informatics (CI) courses are utilized by students in our graduate certificate, masters, PhD and clinical informatics subspecialty fellowship program. We want to map the content of these core CI courses to defined competencies in the field, and develop an updated matrix that will help us understand how the courses we teach meet the competencies defined for clinical informatics. As an intern, you will survey eight CI courses, and review their syllabi, learning materials and associated content. You will get a comprehensive, in-depth exposure to one of the largest and most innovative CI programs in the nation. Plus, you will help to improve the training of informaticians, which is always a good thing (especially if you intend to be one of those informaticians trained!)