Biomedical Informatics Summer Internship Program (BMI SIP)

The Department of Biomedical Informatics hosts an annual internship program each summer which provides high school, undergraduate, and graduate students opportunities to pursue research projects in the field of biomedical informatics under the guidance of research and operational staff and renowned faculty mentors in the Department of Biomedical Informatics. Participants learn useful tools and technologies used in biomedical and clinical research and attend weekly seminars to learn more about the various fields and interdisciplinary interactions biomedical informatics facilitates. Interns also gain very useful presentation abilities through regular lab and programmatic presentation opportunities, including an end-of-program poster session.

Our website: [http://medicine.osu.edu/bmi/careers/students/bmi_internships/pages/index.aspx](http://medicine.osu.edu/bmi/careers/students/bmi_internships/pages/index.aspx)

All student internship positions within the Department of Biomedical Informatics have the potential to be either paid or unpaid, depending on student experience. Most positions have the ability to transition into projects through the school year, and/or count for course credit, depending on performance. Information about our faculty as well as specific internship projects and preferred student skillsets are listed below. If you are interested in getting more information about a specific internship, please email the faculty member directly using their contact information below.

Faculty Information

**James Chen, MD** ([James.Chen@osumc.edu](mailto:James.Chen@osumc.edu))  
Assistant Professor, Departments of Biomedical Informatics and Internal Medicine, Division of Medical Oncology

**Research Interests**
Dr. Chen’s research focuses in the fields of translational bioinformatics and integrative genomics as applied to cancer. He is particularly interested in the personalization of medicine through the development of novel biomarkers of molecular pathway activation using high-throughput genomic techniques. These biomarkers may ultimately assist clinicians in customizing treatment regimens for their patients. Dr. Chen has received numerous awards for his work integrating oncology and bioinformatics. He also has a clinical research interest in prostate, bladder, kidney, and sarcoma cancers.

**Potential Projects for Students**
Dr. Chen is currently looking for one student intern to assist him with projects related to translational bioinformatics in the domain of oncology, integrated genomics, and gene expression analysis. Given the multidisciplinary nature of the projects, there are ample opportunities for both clinical research and wet lab projects.

**Eligibility:** Potential students should be familiar with 1 or 2 of the following: 1) basic biology / medicine 2) familiarity with R scripting, Java, or ability to learn programming languages quickly 3) training in computer science 4) or experience in a molecular biology lab. Much of the learning will be on-the-job.
Ewy Mathé, PhD (Ewy.Mathé@osumc.edu)
Assistant Professor, Department of Biomedical Informatics

Research Interests
The goal of our lab is to define cell-type and disease specific molecular features (intergenic regions, genes, metabolites) to carefully characterize cancer at a molecular level. The overall vision of the lab is to help find candidate biomarkers and therapeutic targets for the diagnosis, prognosis, and treatment of cancer. To accomplish this goal, we are developing and applying computational methods that integrate molecular information, including genomics, epigenomics, and metabolomics. These computational methods include machine learning and statistical modeling, developing databases and R Shiny applications. Importantly, emphasis is placed on developing tools that help interpret results and patterns obtained from high-throughput “omics” data.

Potential Projects for Students
Dr. Mathé is currently looking for 2 students to assist her with projects this summer. Specific projects include: 1) coding and testing simple Shiny apps (the code is/will be written, but needs to be integrated in a we app and then tested); and, 2) searching for and organizing publicly available data sets for epigenomics data, working closely with her lab research technician.

Eligibility: Potential students should be familiar with the R programming language; familiarity with the Linux environment and bash scripting. Although not required, familiarity with snakemake, biology, and biological terminology is preferred.

Timothy Huerta, PhD (Caitlin.Slevin@osumc.edu)
Associate Professor, Departments of Family Medicine and Biomedical Informatics

Research Interests
His principal research agenda focuses upon improving the design of the US healthcare system by developing and validating outcome measures to assist stakeholders in maximizing value for each healthcare dollar spent. This agenda involves process and outcome evaluations, data management, and systems redesign. His most recent publications focus on the analysis of the relationships between efficiency and quality measures.

Potential Projects for Students
Dr. Huerta is seeking 5 student interns to help him with projects this summer. Specific projects include 1) High Touch and High Tech (HT2): Transforming Patient Engagement Throughout the Continuum of Care by Engaging Patients with Portal Technology at the Bedside; 2) Patient Safety Learning Laboratories: Information for the Design of Environments Aligned for Patient Safety (IDEA4PS); 3) Portals in Inpatient Care (PIC): Evaluating the Usability, Use, and Patient Experience Associated with Patient Portal Technology at the Bedside. Students will provide support and assist in research project activities in the Department of Family Medicine, assist with a variety of research-related tasks under the direct supervision of Dr. Huerta, perform literature reviews, assist with coding of qualitative data, and assist with the preparation of reports and research forms.

Eligibility: Potential students should be familiar with STATA and Microsoft Office Suite and have a familiarity with health care and medical terminology.
Kun Huang, PhD (Kun.Huang@osumc.edu)
Associate Professor and Division Director, Division of Computational Biology and Bioinformatics, Department of Biomedical Informatics

Research Interests
Dr. Huang’s research interests include computer vision, machine learning, medical imaging, and computational biology. Some of his recent research topics include microscopic image analysis, hybrid system identification with applications in video segmentation, generalized principal component analysis, geometric theories of computer vision, and symmetry-based recognition and matching.

Potential Projects for Students
Dr. Huang is currently looking for 1-2 students to assist him with projects related to bioinformatics, data analysis, and software development. Specific project topics include 1) integrative analysis of disease and 2) testing innovative ways for integratively analyzing big ‘omics data from multiple types of diseases including cancers and neurological diseases.

Eligibility: Potential students should be familiar with the following: 1) proficient in at least one of the following computer languages: Python, Java, or C++; 2) proficient in one of the following statistical packages: MATLAB or R. Although not required, familiarity with biological and medical terminology are preferred (or a strong interest in learning them), and an understanding in basic linear algebra (e.g., matrix, eigenvalue, and possible SVD) and statistics (t-test and correlation).

David Liebner, MD (David.Liebner@osumc.edu)
Assistant Professor, Departments of Internal Medicine, Division of Medical Oncology and Biomedical Informatics

Research Interests
Dr. Liebner is a practicing medical oncologist and bioinformatician. His current research focuses primarily within the translational bioinformatics area and he continues to be motivated by his research vision, which is to develop and leverage computational tools to improve prognostic and predictive models in Sarcoma. In particular, Dr. Liebner is interested in integrating data from RNA expression, next-generation sequencing, and public cancer databases in order to help guide treatment decisions.

Potential Projects for Students
Dr. Liebner is currently looking for 2 students to assist him with projects this coming summer. Specific projects include 1) Simulating cancer progression and response to treatment in silico; and, 2) Predicting response to chemotherapy in patients with bone and soft tissue sarcoma using molecular and clinical features. Interns will be expected to assist in software development, familiarize themselves with publicly available cancer genomics data repositories (TCGA, COSMIC). Advanced statistical techniques and machine learning approaches will be explored. Interns will be expected to present at Ohio State conferences and will be encouraged to present their work at appropriate international meetings.

Eligibility: Students will be required to have familiarity with MATLAB statistical programming language. Although not required, a familiarity with Java, R, and C++ are preferred. Preference will be given to applicants with an aptitude in cancer genetics and statistics.
Fuhai Li, PhD (Fuhai.Li@osumc.edu)
Assistant Professor, Department of Biomedical Informatics

Research Interests
Dr. Li’s primary research interest are 1) Precision Medicine – to predict best drugs and drug combinations for individual patients by integrating personal genomics data and diverse pharmacogenomics data resources; 2) Stroma-Tumor Interaction – to uncover the crosstalk signaling network between stromal and tumor cells that regulates the tumor progression and drug response. Statistical analysis and Machine learning approaches will be used to solve these challenges.

Example Projects: [http://threesignameicine.com/projects.html](http://threesignameicine.com/projects.html)

Potential Projects for Students
Dr. Li is currently looking for 2 students to assist him with projects this summer. The specific project is to develop a computational widget pipeline and web-tool to construct and display a disease-gene-phenotype-drug network.

Eligibility: Potential students should be familiar with R or Python programming language.