From:	Smith, Randy
To:	Tabung, Fred (OSUMC)
Cc:	Sutherland, Sue; Smith, Randy; Reed, Katie; Miriti, Maria; Duffy, Lisa; Hunt, Ryan; Freitas, Mike; Parvin, Jeffrey; Gold, Jennifer (OSUMC); Moore, Amy (OSUMC); Stromberger, Mary; Griffiths, Rob
Subject:	Proposal to add a Population Science and Data Integration (PSDI) Research Emphasis to the Biomedical Sciences Graduate Program
Date:	Thursday, April 23, 2026 8:49:21 AM
Attachments:	image001.png

Fred:

The proposal from the Biomedical Sciences Graduate Program to add a Population Science and Data Integration (PSDI) Research Emphasis to the Biomedical Sciences Graduate Program was approved by the Council on Academic Affairs at its meeting on April 22, 2026. Thank you for attending the meeting to respond to questions/comments.

No additional level of internal review/approval is necessary. This action will be included in the Council's next Annual Activities Report to the University Senate (July 2026).

The Office of the University Registrar will work with you on any implementation issues.

Please keep a copy of this message for your file on the proposal and I will do the same for the file in the Office of Academic Affairs.

If you have any questions please contact the Chair of the Council, Professor Sue Sutherland (.43), or me.

I wish you success with this important program development.

Randy

THE OHIO STATE UNIVERSITY

W. Randy Smith, Ph.D.
Vice Provost for Academic Programs
Office of Academic Affairs
University Square South, 15 E. 15th Avenue, Columbus, OH 43201
614-292-5881 Office
smith.70@osu.edu
Assisted by:
Katie Reed
Executive Assistant
(614) 292-5672

TO: Randy Smith, Vice Provost for Academic Programs

FROM: Graduate School Curriculum Services

DATE: **2/24/2026**

RE: Proposal to **Establish a New Emphasis Area in the Biomedical Sciences Graduate Program** in **The College of Medicine.**

The **Division of Medical Oncology in the Department of Internal Medicine** in the **College of Medicine** is proposing a **New Emphasis Area in the Biomedical Sciences Graduate Program**.

The proposal was received by the Graduate School on **9/16/2025**. The combined GS/CAA subcommittee first reviewed the proposal on **11/12/2025** and requested revisions. Revisions were received on **2/24/2026** it is supported for review by the Council on Academic Affairs.

THE OHIO STATE UNIVERSITY
COLLEGE OF MEDICINE

C. Alexander Grieco, MD
Interim Vice Dean for Education
Interim Associate Vice President for Health Sciences Education

320L Hamilton Hall
1645 Neil Avenue
Columbus, OH 43210
614.688.3104 phone
Grieco.11@osu.edu

September 15, 2025

W. Randy Smith, Ph.D.
Vice Provost for Academic Programs
Office of Academic Affairs
University Square South
15 E. 15th Avenue
Columbus, OH 43201

Dear Dr. Smith,

I am writing to share my full endorsement, on behalf of the College of Medicine, for the proposed new area of focus within the Biomedical Sciences Graduate Program (BSGP).

Earlier in 2025, the leadership of the BSGP convened to discuss the need for a new area of emphasis for students participating in the program, in the discipline of epidemiology. With careful consideration of 1) the expanding representation of population science and epidemiology within the research work currently underway within the College of Medicine, and 2) of the need for the College to broaden its contribution to the study of health and illness at the level of whole populations, the BSGP's Graduate Studies Committee unanimously endorsed the new area, to be titled "Population Science and Data Integration."

In my role as Interim Vice Dean for Education, I have reviewed the proposal for this new area of focus, and have discussed its reasoning with the BSGP leadership, including the proposed faculty lead, Dr. Fred Tabung. I feel this will be an excellent addition to the BSGP, and am confident that it will provide a rewarding and thoroughly engaging experience for participants, learners and their faculty mentors alike.

Please do not hesitate to contact me if I can provide further information in support of this proposal.

Sincerely,

C. Alexander Grieco, M.D.
Interim Vice Dean for Education
Assistant Professor of Biomedical Education and Anatomy
College of Medicine

CAG:sl

THE OHIO STATE UNIVERSITY
COLLEGE OF MEDICINE

Biomedical Sciences Graduate Program
210 Hamilton Hall
Columbus, Ohio 43210-1239
Phone: 614.685.9140 / Fax: 614.292.6226

January 23, 2025

To: Council on Academic Affairs

Dear Members of the Council on Academic Affairs:

On behalf of the Biomedical Sciences Graduate Program (BSGP) in the College of Medicine, we are writing to express our enthusiastic support for the addition of a Population Science and Data Integration (PSDI) Research Emphasis Area to our curriculum. Following a thorough review of Dr. Fred Tabung's proposal, our Graduate Studies Committee (GSC) unanimously voted in favor of this new emphasis area on November 19, 2024.

The PSDI Research Emphasis Area seeks to train graduate students in the design of novel hypotheses in biomedical research by integrating environmental factors external to the human host with endogenous host factors. This holistic perspective promises a deeper understanding of the determinants of health and disease, and it will enable more effective intervention strategies that account for not only lifestyle modifications but also the underlying biological vulnerabilities of individuals or groups who face specific environmental risks. As research continues to illuminate the complex interplay of environmental factors, endogenous biology, and disease outcomes, the PSDI curriculum will be a valuable addition to the BSGP, equipping students with the knowledge and skills for success in this emerging field.

The proposed PSDI curriculum includes four core areas:
1. Introduction to population health sciences, biostatistics, and epidemiology
2. Biology of disease, multi-omics, and health determinants
3. Environmental and lifestyle influences on health
4. Data integration and computational health science

In addition to these core areas, a new seminar course (Seminars in Population Science and Data Integration) will be developed to introduce students to key research initiatives in each of these domains. Students who complete all BSGP-required coursework and at least 12 credit hours of the PSDI curriculum—9 credit hours of PSDI core courses and 3 credit hours of the PSDI seminar—will receive a formal designation of PSDI Research Emphasis.

The BSGP leadership is confident that this new emphasis area will enrich our graduate program and position our students to become leaders in an exciting and rapidly evolving domain of biomedical science. We respectfully request that the Council on Academic Affairs approve the addition of the PSDI Research Emphasis Area to the BSGP handbook, with the goal of commencing recruitment for this emphasis in fall 2025.

Thank you for your time and consideration of this proposal. We look forward to working closely with you throughout the approval process and welcome any questions you may have.

Sincerely,

Jeffrey Parvin, MD, Ph.D.
Associate Dean for Graduate Studies
Professor and Co-Director,
Biomedical Sciences Graduate Program

Michael Freitas, Ph.D.
Professor and Co-Director,
Biomedical Sciences Graduate Program

THE OHIO STATE UNIVERSITY

Department of Biomedical Informatics
College of Medicine

Lang Li, PhD,
Professor and Chair

250 Lincoln Tower
1800 Cannon Drive
Columbus, OH 43210

614-292-4778 Phone
614-688-6600 Fax

February 21, 2026

Re: Population Science and Data Integration (PSDI) Research Emphasis Area Proposal in the Biomedical Science Graduate Program (BSGP).

Dear Dr. Fred K. Tabung,

Thank you for sharing the proposal to create a Population Science and Data Integration (PSDI) research emphasis in the Biomedical Science Graduate Program. The program has been reviewed by faculty in the Department of Biomedical Informatics (DBMI) and myself. This new PSDI program is highly complementary to the existing Biomedical Informatics Research Emphasis within the BSGP. Data science applications to biomedical science are highly diverse. Our existing Biomedical Informatics Research Emphasis cannot cover all. This is particularly true for many DBMI faculty who conduct biostatistics and population science research, who cannot find a proper channel in training and recruiting graduate students, nor developing training curriculum. This PSDI provides a great opportunity for DBMI for education program development.

After reviewing your proposal, we have provided comments that you have addressed. Several of our faculty have indicated that they would like to be active in this program. Therefore, the DBMI will provide concurrence for this new track.

Sincerely,

Lang Li

Professor and Chair

Department of Biomedical Informatics

College of Medicine

The Ohio State University

College of Public Health

Division of Epidemiology
1841 Neil Ave.
Columbus, OH 43210
Phone (614) 292-7326

January 7, 2026

Dear Fred:

Thank you for sharing the proposal to create a Population Science and Data Integration (PSDI) research emphasis in the Biomedical Science Graduate Program. The divisions that are most closely aligned with the PSDI emphasis have reviewed and approved the proposal. Therefore, the College of Public Health will provide concurrence for this new track.

Sincerely,

Amy K. Ferketich, Ph.D.
Associate Dean of Academic and Student Affairs
Professor, Division of Epidemiology
The Ohio State University College of Public Health
Ferketich.1@osu.edu

College of Medicine (COM)

Biomedical Science Graduate Program (BSGP)

Population Science and Data Integration (PSDI) Research Emphasis Area

Proposal

Revised February 2026

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Executive Summary:

The Biomedical Science Graduate Program (BSGP) in the College of Medicine is seeking the approval of the Council of Academic Affairs (CAA) to add a Population Science and Data Integration (PSDI) Research Emphasis Area to its curriculum. The PSDI emphasis area will train graduate students to generate novel hypotheses and design innovative studies in biomedical research by integrating environmental factors external to the human host with factors endogenous to the host. Such integration provides a more holistic understanding of the determinants of health and disease and enables the design of more effective intervention strategies that consider a range of factors. This includes lifestyle modifications and underlying biological vulnerabilities of individuals or groups directly impacted by the environmental factors to determine disease risk, treatment response and prognosis. Understanding the interplay of environmental factors, endogenous biology, and disease outcomes is emerging as a transformative approach in biomedical research, and the PSDI curriculum is designed to provide students with the required knowledge and skills for success in this novel area.

The PSDI curriculum covers foundational concepts as well as specialized topics that allow students to integrate knowledge across domains. The coursework covers four core areas including 1) Introduction to population health sciences, biostatistics and epidemiology, 2) Biology of disease, multi-omics, and health determinants, 3) Environmental and lifestyle influences on health, and 4) Data integration and computational health science. Core courses and electives have been identified for each core area. In addition, a seminar course (Seminars in population science and data integration) will be designed to cover each of the four core areas in a single course to be offered in the fall semester and expose PSDI students to research in the core areas, early in the program.

Students will receive the designation of PSDI Research Emphasis after completing all BSGP required courses, and at least 12 credit hours of the PSDI curriculum, which includes nine credit hours of PSDI core courses and 3 credit hours of the PSDI seminar course. This proposal was presented and discussed at the BSGP Graduate Studies Committee (GSC) on November 19, 2024, after which the GSC voted unanimously to move forward with the new research emphasis area. BSGP leadership is therefore requesting the approval of the CAA to add the PSDI Research Emphasis Area to the BSGP handbook, and for the research emphasis area to become operational and recruiting students starting in fall 2026.

Background:

Dietary, lifestyle, and other environmental exposures can interact in complex ways with an individual's biological processes resulting in changes to genes, proteins, metabolites and the microbiota (multi-omics). These interactions may influence the development or suppression of disease by modifying gene expression, immune response, and/or metabolic pathways. Omics data provide insights into the biochemical and molecular changes in the body. By linking these changes to external exposures like diet and lifestyle, we can better understand the mechanisms that drive disease development and progression.

Integrating factors impacting the human host environment with factors endogenous to the host provides a more holistic understanding of the determinants of health and disease, which enables the design of more effective intervention strategies that consider not only lifestyle modifications but also the underlying biological vulnerabilities of individuals or groups. In public health, this holistic approach is essential to reduce health disparities and tailor population-level interventions to specific subpopulations, while identifying relevant and effective (i.e., linked to environmental exposures) biological targets to serve as biomarkers of disease risk, disease progression, or treatment response.

Population science and human biology have typically been developed and implemented as separate disciplines. For example, population-level disease prevention strategies are designed and implemented without much knowledge of the biological factors mediating the success or lack thereof, of such strategies, and human biology has led to therapies that may succeed or not, without knowledge of the environmental factors directly impacting the human biological systems or pathways impacted by these therapies. Understanding the interplay of environmental factors, endogenous biology, and disease outcomes, is emerging as a transformative approach in biomedical research for several reasons:

- Comprehensive understanding of disease etiology, e.g., obesity may increase breast cancer risk due to inflammation driven by both diet and microbiome dysbiosis, modulated by individual genetic predisposition.
- Improvements in personalized medicine, e.g., precision nutrition approaches can recommend diets tailored to a person’s microbiome or metabolome composition, reducing cardiovascular risk more effectively than the one-size-fits-all guidelines.

- Improved prevention strategies, e.g., sleep disruption has been linked to altered metabolomic profiles that elevate diabetes risk. Public health programs promoting sleep hygiene can mitigate this.
- Optimized treatment response, e.g., the gut microbiome profiles predicts response to immunotherapy in cancer. Patients with unfavorable microbiomes may benefit from pre-treatment dietary pattern interventions to improve microbiome profiles.
- Effectively addressing racial and ethnic disparities in disease burden, e.g., by integrating population-level data with individual-level biology, disparities in disease burden (e.g., racial differences in prostate cancer outcomes) can be better understood and mitigated.
- Advancing systems biology, e.g., major chronic diseases are not caused by isolated factors but by complex systems involving the interplay of the environment and biology. Population science combined with systems biology offers a holistic view, moving beyond reductionist approaches to identify actionable targets for prevention and treatment.

Comparative data from other institutions:
Currently, no other institution has implemented a similar program to PSDI, but this is an emerging research area. Several institutions have multidisciplinary programs in population health and demography, combining aspects of epidemiology, demography and data science, which is not the same as PSDI.

Specific actions and any corollary issues (positive/negative) that will arise from implementation:

- The programmatic change that will occur internally is the addition of this research emphasis area in the BSGP curriculum and students will enroll and select this emphasis area as one of the multiple choices of research emphasis areas available to BSGP students.
- Students will be trained and equipped with the necessary knowledge and skills to fully embrace this emerging and transformative research area.
- This addition will not negatively affect faculty, graduate/undergraduate students, staff, alumni, or accrediting organizations.

- Students and staff outside of BSGP are free to take PSDI courses if they feel that such electives may enhance their academic careers.
- The content of PSDI overlaps with the content of other units only to the extent that appropriate electives have been identified in other units and placed in one central location for the convenience of PSDI students.
- The addition of PSDI will help recruit students to BSGP that may not have been aware of research opportunities in that area at Ohio State.

Committees at the department, college, and university that have reviewed and approved the proposal:

The draft proposal was reviewed and discussed by the BSGP leadership (Drs. Jeff Parvin, Mike Freitas and Ms. Amber Robinson) during their weekly meeting on October 17, 2024. They recommended that the faculty lead, Dr Fred Tabung, present the proposal to the BSGP Graduate Studies Committee (GSC) on November 19, 2024. After this presentation, the GSC discussed the proposal and agreed that PSDI represented a growing area of research in the biomedical sciences. Members of the GSC suggested several faculty members already conducting research in PSDI and voted unanimously to move the proposal forward. The proposal was then forwarded to the Curriculum Representative in the College of Medicine, Dr Dan Clinchot (now retired), who reviewed and recommended that the proposal be submitted to the Council of Academic Affairs (CAA) for approval.

On initial CAA administrative review, Dr Alexander Grieco, Interim Vice Dean for Education in the College of Medicine, provided a letter of support on September 15, 2025. The proposal has been further reviewed and discussed with the College of Public Health. The Vice Dean for Academic Affairs, Dr. Amy Ferketich, provided concurrence following review by Dr. Kellie Archer, Biostatistics Division Chair, and Dr. Jiyoung Lee, Academic Affairs Representative in the Division of Epidemiology. The proposal was also reviewed in the Department of Biomedical Informatics (BMI). After initial discussions between Dr. Tabung and Department Chair, Dr. Lang Li, the proposal was circulated to BMI faculty for feedback. Dr. Li provided detailed comments, including recommendations regarding BMI course offerings and faculty engagement. Following these discussions, Dr. John Bridges was appointed as BMI liaison to the initiative. Dr. Tabung subsequently met with Dr. Bridges, who reviewed the proposal and shared it with faculty in the

BMI Division of Population Health and Biostatistics. The division provided additional edits and invited Dr. Tabung to present the proposal at a divisional meeting. After the presentation and discussion, a subcommittee met with Dr. Tabung for further clarification and refinement. Following this review process, the division indicated its support for the proposal.

Availability of resources:

Resources for the PSDI research emphasis area including initial faculty members, learning resources in terms of available data, and funding, are described.

Faculty: Faculty members listed below have contributed to the development of PDSI research emphasis area and have agreed to attract and mentor students with their available funding. Each faculty member is currently affiliated with BSGP and will be more involved once the PSDI area is operational and actively recruiting students. This group of faculty members will continue to expand as we learn more about other eligible and interested faculty members.

- Fred K. Tabung, PhD, MSPH: Division of Medical Oncology, Department of Internal Medicine, College of Medicine
- Ting-Yuan (David) Cheng, PhD, MHS, MS: Division of Cancer Prevention and Control, Department of Internal Medicine, College of Medicine
- Holli Loomans-Kropp, PhD, MPH: Division of Cancer Prevention and Control, Department of Internal Medicine, College of Medicine
- Amanda E. Toland, PhD: Division of Cancer Biology and Genetics, Department of Internal Medicine, College of Medicine
- Xiaokui (Molly) Mo, PhD, MS, Department of Biomedical Informatics (BMI), College of Medicine
- John F. P. Bridges, PhD, Department of Biomedical Informatics (BMI), College of Medicine, and Liaison to BMI
- Soledad Fernandez, PhD, Department of Biomedical Informatics (BMI), College of Medicine

Funding:

- Listed faculty will initially recruit students based on their current available funding.
- We plan to submit training grants to the National Institute of Health (NIH), and CAMELOT has agreed to provide guidance in this process. The Center for Cancer

Mentoring, Education, Leadership and Oncology-Related Training (CAMELOT) serves as the centralized hub fostering cancer research and education for all levels of learners and disseminating those opportunities across the university.

- We will also take advantage of any fellowships, Graduate Research Assistant (GRA) positions funded through COM, BSGP or the university, to aid students in the completion of PSDI.

Data sources:

- TCC-ORIEN – a large national network of tumor sequencing data paired with clinical and demographic data available. Some of the listed faculty are currently completing data integration projects in TCC-ORIEN.
- All listed faculty have multiple ongoing research projects in their labs for experiential training of students.
- All listed faculty are involved in large consortia-based studies and have access to multiple sources of data for training students
- DLOMICS cohort – Dietary, Lifestyle and Omics Integration Study cohort. Led by the Tabung Lab, the protocol for this large prospective non-therapeutic observational study cohort received OSU IRB approval for enrollment in August 2025 and began enrollment in early 2026.
- LINEAGE Consortium – Lynch syndrome Integrative Epidemiology And GEnetics Consortium. Dr. Loomans-Kropp, along with 18 institutions nationally, a retrospective and prospective cohort of individuals with Lynch syndrome, a heritable cancer predisposition syndrome, focused on identifying novel risk factors and interventions in this population. This consortium will be active at OSU in 2026 and can offer students the opportunity to ask clinically relevant questions, integrating patient survey, medical record, and genetic data.
- Secondary data analyses using omics data: Ongoing studies in the Loomans-Kropp lab – Inflammatory biomarker expression in association with quality-of-life measures in the Cancer Disparities Research Network; Differences in global methylation profiles by racial/ethnic background in the Cancer Disparities Research Network
- Other data sources include OSU Helix and All of US, led by NIH and available to the research community

- Dr Cheng has access to data in multiple cohorts including WHI, UK Biobank, TCGA, CPTAC, WCHS, NHANES, and Pathways Study.
- Dr. Bridges was the PI of the coordinating center for the Participant Engagement and Cancer Genome Sequencing (PE-CGS) is filling gaps in the molecular profiles of cancers, particularly rare cancers and those that are highly lethal.
- Dr. Fernandez areas of research are in genomics biostatistics; study design (cancer biology, clinical trials, observational studies); methods for the analysis of correlated longitudinal data, complex correlation structure data (pedigree data), development, validation and implementation of clinical/research data coordinating centers to support and enhance scientific rigor and reproducible biomedical research.

PSDI Curriculum

The Population Science and Data Integration (PSDI) research area curriculum covers foundational concepts as well as specialized topics that allow students to integrate knowledge across domains. The curriculum includes core courses focused on understanding the interplay between environmental factors, biology of the human host, and data science. Electives allow students to explore specific areas of interest, such as various omics, health disparities, or advanced statistical methods.

Core Courses

These courses provide a strong foundation in the core principles of population science, biology, and data integration, with an emphasis on differences in exposure to environmental factors leading to disparities in disease occurrence and outcomes. A core PSDI curriculum of 12 credit hours with nine (09) credit hours of didactic courses and three (03) credit hours of the PSDI seminar course, is required to receive the designation of PSDI Research Emphasis. Students fulfill the nine credit hours by selecting one course from any of the four core course areas. To request a replacement or alternative course, the student will submit the syllabus and justification to the faculty lead for review and approval. Core courses cover four core areas:

Introduction to population health sciences, biostatistics and epidemiology: An overview of population health principles, health determinants, and public health frameworks. Focuses on understanding how societal, environmental, and behavioral factors affect health. Covers fundamental statistical methods for population health research, including study design, risk factor analysis, and biostatistical techniques commonly used in epidemiological studies.

Biology of disease, multi-omics and health determinants: Explores the biological underpinnings of disease, covering immune responses, metabolic pathways, and the role of multi-omic technologies, and providing a foundation for understanding host factors. Introduction to genomics, transcriptomics, proteomics, metabolomics, and microbiome, with an emphasis on their applications in understanding population health.

Environmental and lifestyle influences on health: Examines the impact of environmental factors (diet, lifestyle, other social determinants of health, pollution) on health. Includes case studies on diseases impacted by these factors, such as cancer and other metabolic diseases.

Data integration and computational health science: Introduction to computational methods and tools for integrating diverse datasets (e.g., clinical, genetic, environmental). Covers bioinformatics and the basics of big data in biomedical research.

Seminars in population science and data integration: We will design a seminar course that will cover each of the four core areas of emphasis with 2 to 4 speakers (about 20% to 25%) in each area. Lecturers will be recruited mainly from OSU (to limit cost) but may also include external speakers. This course will also cover topics in research design, ethical considerations, and data collection techniques in population health and integration of diverse data sources. In planning the course, we will liaise with coordinators of other seminar courses in the BSGP program and on campus, to coordinate speakers in case there is interest in a common topical area, and to avoid overlapping significantly with content in other seminar courses. This course will be offered in the fall semester to expose PSDI students to research in the core areas, early in the program.

Electives Courses:

Elective courses are optional and selected to enhance one or more of the core areas of PSDI. Students are encouraged to enroll in electives that best complement their training.

Course Code	Credit hours	Course Name	Term offered
Core Course Areas and Specific Courses in Each Area Minimum of Nine Credit-Hours			
Introduction to population health sciences, biostatistics and epidemiology			
PUBHEPI 7410	4	Epidemiology II	spring
STAT 5301	4	Intermediate Data Analysis I	Fall & summer
BMI 7810	3	Research Design & Grant Preparation in Biomedical Informatics	spring
Biology of disease, multi-omics and health determinants			
HUMNNTR 7600	3	Metabolomics, Principles and Practice	spring
MICRBIO 7010	3	Cellular and Molecular Immunology	fall
MICRBIO 6020	3	Microbial Physiology and Biochemistry	fall
Environmental and lifestyle influences on health			
PUBHBIO 6415	3	Nutrition in Public Health	Spring, every other year
PUBHEPI 7411	3	Epidemiology in Environmental Health	spring, every other year
VETPREV 8700	3	Molecular Epidemiology of Infectious Diseases	spring
Data integration and computational health science			
STAT 5731 or STAT 5732	2	Introduction to R for data science I: Basic R Introduction to R for data science II: Intermediate R	Fall, spring, summer (online)
BMI 5730	3	Introduction to Bioinformatics	spring
BMI 5750	3	Methods in Biomedical Informatics and Data Science	spring
Seminar Course Repeatable to Three Credit-Hours			
Seminar			
XXXXX XXXX	1	Seminars in Population Science and Data Integration	xxxxxxx
Elective Courses Optional courses to be used to fulfill BSGP degree requirements			
PUBHBIO 6211	3	Applied Biostatistics II	Fall, spring
PUBHBIO 7235	3	Applied Survival Analysis	spring
PUBHEPI 6442	3	Social Epidemiology	fall
CBG 5700	3	Introduction of personalized therapeutics and pharmacogenomics	spring
PATHOL 7847	2	Cellular Mechanisms and Pathogenesis of Inflammation	spring, every other year
CBG 8270	2	Biochemical Mechanisms of Carcinogenesis (Hallmarks of Cancer)	fall
MOLGEN 5300	2	Cancer Genetics	fall
PATHOL 6640	4	Fundamentals of Oncology	spring
CBG 8250	2	Biology of the Tumor Microenvironment	fall
CBG 8270	2	Biochemical Mechanisms of Carcinogenesis	fall
PUBHBIO 5280	3	Introduction to Genomic Data Analysis	spring
HNASCI 8833	3	Diet, Nutrition and Cancer	Fall, every other year
HUMNNTR 8801	3	Advanced Macronutrient Metabolism	spring

BMI 7040	3	Clinical Informatics	spring
BMI 5553	3	Predictive Analytics in Electronic Health Records	fall
BMI 5554	3	Natural Language Processing in Biomedical Informatics	spring
BMI 7235	3	Applications of Machine Learning for Bioinformatics	spring
MICRBIO 8161	3	Microbiome Informatics	fall
BSGP 7030	2	Introduction to Data Science in Biomedical Science Research	summer