Biomedical Informatics Masters and Certificate Programs

Student and Faculty Handbook

2026-2027

Contents

Part I: Student Handbook 6

IBI Educational Programs Contacts 7

Master of Clinical Informatics (MCI) Program 8

Introduction 8

Program Learning Objectives 8

Academic Program 8

MCI Curriculum 8

Capstone Projects 10

Elective coursework eligibility 12

Master of Science in Biomedical Informatics (MSBMI) Program 13

Introduction 13

Academic Program 13

Program Concentrations 13

MSBMI Curriculum 13

Thesis 15

Mentorship and Student Advising 16

Master's Thesis Advisor 16

Master's Thesis Committee Member 16

Transfer Policy: MCI to MSBMI 16

Certificate in Biomedical Informatics Program 18

Transfer Policy: BMI Certificate to MCI 18

PSOM Clinical Informatics Area of Concentration Program 19

Program Objectives 19

Time to Degree 20

MCI and BMI Certificate Programs 20

MSBMI Program 21

CSI concentration full-time program (two years to completion) 21

CSI concentration part-time program (three years to completion) 21

TBI concentration full-time program (two years to completion) 22

TBI concentration part-time program (three years to completion) 22

HAI concentration full-time program (two years to completion) 23

HAI concentration part-time program (three years to completion) 23

PSOM and University Policies 24

Student Conduct 24

Responsible Student Conduct 24

Code of Academic Integrity 24

Code of Student Conduct 25

University of Pennsylvania Equal Opportunity and Nondiscrimination Statement 25
Sexual Misconduct Policy, Resource Offices and Complaint Procedures 25
Student Grievance Procedure 25
Financial Policies 25
Authorship 25
Tuition and Fees 25
Description of Fees *26*
Supplemental Financial Policies 26
Registration 26
Registration Process *26*
Continuous Registration *26*
Leave of Absence *26*
Grading *27*
Audit Policy *28*
Academic Standing & Probation *28*
Transfer Credit Policy (MCI Students Only) *29*
Graduation *30*
Voluntary Withdrawal from Program *30*
Drop from Program *30*
Academic Grievances *30*
International Students 30
Administrative Requirements 31
Research Regulations Compliance *31*
Penn Systems 31
PennCard *31*
PennKey *31*
Path@Penn *31*
Canvas *31*
University Resources 33
Graduate Student Center 33
Weingarten Learning Resources Center 33
Counseling and Psychological Services (CAPS) 33
Administrative Structure 34
Program Director 34
The Executive Committee 34
Admissions Committee 34
Advising and Curriculum Committee 34
Faculty Mentors and Advising Roles 35
Master's Thesis Advisor (MSBMI degree) *35*
Master's Thesis Committee Member (MSBMI degree) *35*
Capstone Advisor (MCI degree) *35*
Academic Advisor (MSBMI and MCI degrees) *35*

Part II: Faculty Handbook **36**

Office of the Provost: Faculty Handbook **37**

Principles of Responsible Conduct **38**

Academic Calendars / Course Scheduling **39**
The University of Pennsylvania Academic Calendars 39
Policy on Secular and Religious Holidays 39
Calendar of Secular and Religious Holidays 39
Final Exam Information 39
Academic Breaks 39
Suspension of Normal Operations / University Closures 39

Program Committees **40**
Executive Committee 40
Admissions Committee 40
Advising and Curriculum Committee 41

Program Advisors and Mentors **43**
Master's Thesis Advisor (MSBMI degree) 43
Master's Thesis Committee Member (MSBMI degree) 43
Capstone Advisor (MCI degree) 44
Academic Advisor (MSBMI and MCI degrees) 44

Syllabi **45**

Canvas **46**

Course Enrollment Policy **47**

Course Drop / Withdrawal Policy **48**

Teaching Assistants (TAs) **49**
Guidelines for Allocation of Teaching Assistants 49
Teaching Assistants' Responsibilities 49
Resources for Teaching Assistants 50

Grades and Academic Standards **51**
Standardized Grading Scale 51

Course Evaluations **52**

New Courses **53**

Student Intervention Services **54**

Guidelines for Addressing Academic Issues of Students with Disabilities **55**

Resources for Teaching at Penn **56**

Center for Excellence in Teaching, Learning and Innovation (CETLI) 56

Appendix A. Checklist for Academic Advisors 57

New Students 57

First Meeting – During New Student Orientation (Fall, Year 1) 57

Continuing Students 57

Start-of-Semester Meeting (Each subsequent semester) 57

Program-Specific Milestones to Keep in View 58

MSBMI – Thesis 58

MCI – Capstone 58

Appendix B. Approved Elective Courses 59

Part I: Student Handbook

IBI Educational Programs Contacts

Program Director
John H. Holmes, PhD, FACE, FACMI
Professor of Medical Informatics in Epidemiology
3600 Civic Center Blvd., 5E-300B
jhholmes@pennmedicine.upenn.edu

Program Associate Director
Dokyoon Kim, PhD
Associate Professor of Informatics, Department of Biostatistics, Epidemiology & Informatics
Director, Center for AI-Driven Translational Informatics (CATI)
Associate Director of Informatics, Immune Health
3700 Hamilton Walk, B304 Richards Bldg.
dokyoon.kim@pennmedicine.upenn.edu

Program Associate Director
Joseph Daniel Romano, PhD, MPhil, MA, FAMIA
Assistant Professor of Informatics and Pharmacology
3600 Civic Center Blvd., 5E-300A
joseph.romano@pennmedicine.upenn.edu

Education Program Manager
Meg Tanjutco
C211 Richards Building
tanjutco@pennmedicine.upenn.edu

Handbook last edited: 8/16/26 10:37:00 PM

Master of Clinical Informatics (MCI) Program

Introduction

The Master of Clinical Informatics (MCI) program serves the needs of Penn Medicine by training the next generation of clinical informaticians. These are individuals who seek to leverage their background and practice as professional clinicians to bring state-of-the-art informatics theory and practice to the clinical setting. As a result, the program is dedicated to training applied clinical informaticians, rather than informatics researchers.

Program Learning Objectives

Our program's objectives are drawn from the key competencies identified by the American Medical Informatics Association's 2017 guidelines, which identify the skills and knowledge that informatics practitioners need to set themselves apart in a rapidly developing field. By graduation, students should be able to:

1. Identify the applicable information science and technology concepts, methods, and tools, which may be dependent upon the application area of the training program, to solve health informatics problems.
2. Identify and draw on the social, behavioral, legal, psychological, management, cognitive, and economic theories, methods, and models applicable to health informatics to design, implement, and evaluate health informatics solutions.
3. Identify possible biomedical and health information science and technology methods and tools for solving a specific biomedical and health information problem. Design a solution to a biomedical or health information problem by applying computational and systems thinking, information science, and technology.
4. Define and discuss the scope of practice and roles of different health professionals and stakeholders, including patients, as well as the principles of team science and team dynamics to solve complex health and health information problems.

Academic Program

MCI Curriculum

The MCI curriculum consists of 10 course units (CUs), which include required courses, electives, and a capstone project. Students are also required to complete the online HIPAA and CITI training modules required of all PSOM students.

The 10 CUs in the MCI program are divided as follows:

A. 4.0 CUs in "Core BMI" (common courses across IBI programs):

- **BMIN 5010: Introduction to Biomedical and Health Informatics (Fall)** This course is designed to provide a survey of the major topic areas in medical informatics, especially as they apply to clinical research. Through a series of lectures and demonstrations, students will learn about topics such as medical data standards, electronic health record systems, natural language processing, clinical research informatics, clinical decision support, imaging informatics, public health informatics, consumer health informatics, perioperative informatics, and mental health informatics.
- **BMIN 5020: Database and Data Integration in Biomedical Research (Spring)** This course is intended to provide in-depth, practical exposure to the design, implementation, and use of databases in

biomedical research, and to provide students with the skills needed to design and conduct a research project using primary and secondary data. Topics to be covered include: database architectures, data normalization, database implementation, client-server databases, concurrency, validation, Structured-Query Language (SQL) programming, reporting, maintenance, and security. All examples will use problems or data from biomedical domains. MySQL will be used as the database platform for the course, although the principles apply generally to biomedical research and other relational databases.

- **BMIN 5030: Data Science for Biomedical Informatics (Fall)** This course will use RStudio/R and other freely available software to learn fundamental data science applied to a range of biomedical informatics topics, including those making use of health and genomic data. After completing this course, students will be able to retrieve and clean data, perform exploratory analyses, build and evaluate models to answer scientific questions, and present visually appealing results to accompany data analyses; be familiar with various biomedical data types and resources related to them; and know how to create reproducible and easily shareable results with RStudio/R and GitHub.
- **BMIN 5040: Special Topics in Biomedical and Health Informatics (Spring)** This course is designed to provide an in-depth look at topics that are of essential importance in biomedical informatics. Each topic will be arranged into thematic modules which will occur in consecutive weeks in the class schedule, with the intention that each module becomes its own "mini-course". The topics for each module may rotate from semester to semester, based on these criteria: Historical importance to the current field of biomedical informatics research and/or practice; Cutting-edge developments in biomedical informatics; Topics not covered in depth in BMIN 5010; Consensus of the program leadership and teaching faculty.

B. 3.0 CUs in "Core Clinical Informatics":

- **BMIN 5060: Standards and Clinical Terminologies (Spring, 1.0 CU)**

  This survey course is designed to provide an overview of health information standards and clinical terminologies. Through a series of lectures, demonstrations, and hands-on exercises, students will learn about topics such as standards, interoperability, data modeling, vocabularies, and health information exchange.

- **BMIN 5070: Human Factors (Fall, .50 CU)**

  Topics include:

  · Sociotechnical and human-centered design in everyday life and in biomedical informatics--especially as applied to medical systems and professional expectations.

  · Implementation and optimization of healthcare technology —including tensions among existing vs revised workflows, new software vs legacy systems, vendor software vs need for new builds, customization, retrofits, dongles, etc;

  · Evaluation and measurement of usability as applied to healthcare technology within the evolving complexities of medical systems, organizational hierarchies, professional norms, allocation of resources, and market realities;

  · Implications of healthcare technology and AI for medical ethics, changing disease and treatment protocols, government policy, cybersecurity, and advocacy.

- **BMIN 5120: Human Computer Interaction for Healthcare (Fall, .5 CU)**

  This course provides a foundation for practical, hands-on application of human computer interaction in the design and implementation of technology-based healthcare applications. Topics will include:

  · Human Computer Interaction history, key concepts, and relation to human factors;

- Complex applications and multiple methods for design in applications such as electronic health records, mobile applications, and safety event reporting;
- Practical application of methods such as problem definition, contextual interview, think-aloud protocol, cognitive walkthrough, and usability testing; and
- Artificial Intelligence in healthcare including of Natural Language Processing (NLP) and Large Language Models (LLMs) as tools for documentation and reducing clinician burnout.

- **BMIN 5110: Biomedical Informatics Methods for Learning Health Systems (Spring, 1.0 CU)**
  - This course provides an introduction to the concepts and principles of learning health systems, focusing on the roles and methods of biomedical informatics in the data-knowledge-practice learning cycle that is the hallmark of such systems. Topics to be included in the course are history of health systems; information systems analysis and design as these apply to learning health systems; methods for integrating data from heterogeneous sources; analytic methods for establishing evidence and evaluating its usefulness in improving patient outcomes; and, working with teams in the learning health system context. There is a strong emphasis on applying these techniques to real-world issues with clinical and clinical research information systems. These include the electronic health record, information systems in clinical specialties, and systems to support the management of data used for clinical research and healthcare administration.

C. 2.0 CUs of electives (further expertise in clinical informatics methods or issues)

- A list of approved electives is provided in Appendix B. This represents elective courses that have previously been approved by the Curriculum Committee on the basis of relevance to program goals. If you would like to take an elective that is not on this list, a request for review can be made by contacting Meg Tanjutco via email. All elective enrollment decisions should be made following consultation with your academic advisor.

D. 1.0 CU Capstone Project (formal, mentored practicum)

- **BMIN 9900: Capstone (See below)**

If a desired elective is not listed above, students should file a request through the Curriculum Committee for approval. Approval is granted on (1) relevance to clinical informatics, (2) addressing one or more of the key competencies of the MCI program, and (3) suitability for the student's future career goals. In general, electives only need to be approved once – after receiving approval, the elective will be available to future students in the MCI degree program.

Capstone Projects

General description

The MCI program requires that students engage in a mentored Capstone Project in clinical informatics during their final year. This is accomplished in the context of a seminar in which students develop, propose, implement, and present their capstone project. During the semester, students meet regularly with their Capstone Advisor, who is also invited to attend the seminars. The seminar offers both students and advisors the opportunity for cross-fertilization of ideas and skills, and ultimately the honing of projects to a high level of value for the students and the clinical environments in which they conduct their projects.

Required Prerequisites

A minimum of 7 CUs of the required coursework of the MCI Program is required to begin the capstone project.

Capstone Advisors

Each project is supervised by an IBI Senior Fellow, selected by the student and vetted by the Advising Committee. The Capstone Advisor will be selected by the student for expertise in the topic addressed in the

capstone. Additional individuals with expertise relating to the student's project can join the advisory team as needed. The Capstone Advisor will be responsible for ensuring a high degree of quality of the project and the student's work thereupon. The Capstone Advisor will be responsible for guiding and evaluating the student's progress throughout the semester, and for submitting the final evaluation and a grade. This grade is then used as part of the overall capstone grade (see Deliverables below).

Students are provided a list of IBI Senior Fellows who have volunteered to serve as capstone advisors. With the guidance of their academic advisor, students should select a mentor aligned with the area of focus of their desired capstone project, and ask the mentor if they would be willing to serve in this mentorship role. Capstone mentor assignments must be approved by the MCI Advising Committee based on suitability of the mentor to direct the intended capstone project.

MCI students should meet with their capstone mentor at least once before approval of the capstone project (to plan the details of the project), and frequently during the semester when the capstone project is being completed. The precise level of involvement is up to the mentor and the student, but as a general guideline should involve a minimum of one meeting per month while the capstone project is being carried out.

Capstone projects

Capstone projects may align with the day-to-day responsibilities of the student's employment or may be in a new area of interest. Projects should be completed in the course of a 15-week semester. However, the proposal and determination of Capstone Mentor takes place in the semester prior to the capstone project semester. For example, if a student intends to perform their capstone project in the spring semester, then the proposal and mentorship team deliverables are due in the fall semester. Sample projects could include:

1. Design, implementation, and evaluation of a clinical decision rule
2. A workflow analysis pertinent to a given clinical environment
3. Evaluation of a feature or set of features of an existing clinical information system
4. Development and evaluation of a training program for new users of a clinical information system
5. Assessment of clinical information system adoption by health professionals
6. Design, implementation, and evaluation of a novel feature in a patent portal system
7. Development and evaluation of a program for improving patient engagement in using patient portals
8. Design and evaluate a clinical process improvement

Deliverables

The capstone will culminate in the preparation of a written final report and a PowerPoint capstone project presentation.

The written final capstone report paper will consist of the following:

- A thorough critical review of pertinent literature
- A statement of the problem or research question
- A clearly articulated statement of the goal(s) of the project
- A description of the aims proposed to address the goal(s)
- Methods used to address the aims
- Results
- Discussion of the results
- Conclusion
- Description of future directions

Two IBI Senior Fellows will serve as Discussants and will evaluate both the written final capstone report paper and the capstone project presentation and provide oral and written feedback to the student and Capstone

Advisor.

The components of the student's final capstone grade (for the semester) are as follows:

- Capstone Final Capstone Report Paper - 50%
- Capstone Advisor Grade - 35%
- Capstone Final Capstone Project Presentation - 15%

Elective coursework eligibility

Elective courses must be approved by the Curriculum Committee prior to enrollment, and following completion of the MCI Elective Approval Form, which is available from the Program Coordinator. Students will be required to provide a justification for the requested elective coursework, including a description of how the course(s) accomplish their future career and/or research goals.

In situations where similar elective courses are offered within the BMIN program and in other departments/programs, students will be expected to enroll in the BMIN course. For example, courses focusing on Artificial Intelligence are offered in several different schools and departments at Penn. Since the courses external to BMIN do not focus on applications of AI in health, those courses are less appropriate for MCI students, and therefore the student should enroll in the BMIN equivalent. Exceptions to this guideline may be granted if the BMIN equivalent is not compatible with the student's schedule or if the external course covers subject matter that is particularly important to the student's future career or research goals – these situations should be clearly documented in the MCI Elective Approval Form upon submission.

Master of Science in Biomedical Informatics (MSBMI) Program

Introduction

The Master of Science in Biomedical Informatics (MSBMI) program provides comprehensive, research-driven training designed to prepare students for impactful careers as innovators and investigators in biomedical informatics. With a strong focus on advanced research methodologies, the MSBMI curriculum culminates in a mentored research project and thesis defense. This rigorous training ensures graduates are well-equipped to advance knowledge and lead developments within the rapidly evolving field of biomedical informatics.

Academic Program

Program Concentrations

Students in the MSBMI will declare in one of three available concentrations: Clinical Science Informatics (CSI), Translational Bioinformatics (TBI), and Health Artificial Intelligence (HAI). The three concentrations differ in their course curriculum and in the domain focus of the master's Thesis. Students will seek a thesis mentor with primary expertise in the declared concentration.

Clinical Science Informatics (CSI) concentration

The CSI concentration provides rigorous research training in the combined domains of Clinical Informatics and Clinical Research Informatics. Student in this track participate in coursework and thesis research that focuses on both the application of informatics in the delivery of healthcare services, and the subsequent application of informatics to discover new knowledge from clinical data (including data derived from clinical trials).

Translational Bioinformatics (TBI) concentration

TBI is the branch of biomedical informatics that focuses on discovering new knowledge by integrating both "bench" (biological/molecular) and "bedside" (clinical or epidemiological) data. TBI is also deeply involved in the development of new techniques to store, analyze, and interpret increasingly voluminous biomedical datasets. Students in the TBI concentration will take coursework to deepen their expertise working with data modalities that span the translational spectrum and will conduct original research that combines these modalities in novel and impactful ways.

Health Artificial Intelligence (HAI) concentration

Artificial Intelligence (AI) has been deeply integrated in clinical and biomedical discovery since its emergence in the late 1950s. Today, more than ever, AI touches all facets of biomedical research and healthcare delivery. Students in the HAI concentration will learn how to apply AI for both discovery and the improvement of healthcare delivery. Although students may perform AI-based research in many aspects of biomedicine, the program places special emphasis on the application and assessment of AI technologies at the point of clinical care.

MSBMI Curriculum

The MSBMI curriculum consists of 12 course units (CUs), which include required courses, electives, and a research-based master's thesis. Students are also required to complete the online HIPAA and CITI training modules required of all PSOM students.

The 12 CUs in the MSBMI program are divided as follows:

A. 4.0 CUs in "Core BMI" (common courses across IBI programs):

- **BMIN 5010: Introduction to Biomedical and Health Informatics (Fall)** This course is designed to provide a survey of the major topic areas in medical informatics, especially as they apply to clinical research. Through a series of lectures and demonstrations, students will learn about topics such as medical data standards, electronic health record systems, natural language processing, clinical research informatics, clinical decision support, imaging informatics, public health informatics, consumer health informatics, perioperative informatics, and mental health informatics.
- **BMIN 5020: Database and Data Integration in Biomedical Research (Spring)** This course is intended to provide in-depth, practical exposure to the design, implementation, and use of databases in biomedical research, and to provide students with the skills needed to design and conduct a research project using primary and secondary data. Topics to be covered include: database architectures, data normalization, database implementation, client-server databases, concurrency, validation, Structured-Query Language (SQL) programming, reporting, maintenance, and security. All examples will use problems or data from biomedical domains. MySQL will be used as the database platform for the course, although the principles apply generally to biomedical research and other relational databases.
- **BMIN 5030: Data Science for Biomedical Informatics (Fall)** This course will use RStudio/R and other freely available software to learn fundamental data science applied to a range of biomedical informatics topics, including those making use of health and genomic data. After completing this course, students will be able to retrieve and clean data, perform exploratory analyses, build and evaluate models to answer scientific questions, and present visually appealing results to accompany data analyses; be familiar with various biomedical data types and resources related to them; and know how to create reproducible and easily shareable results with RStudio/R and GitHub.
- **BMIN 5040: Special Topics in Biomedical and Health Informatics (Spring)** This course is designed to provide an in-depth look at topics that are of essential importance in biomedical informatics. Each topic will be arranged into thematic modules which will occur in consecutive weeks in the class schedule, with the intention that each module becomes its own "mini-course". The topics for each module may rotate from semester to semester, based on these criteria: Historical importance to the current field of biomedical informatics research and/or practice; Cutting-edge developments in biomedical informatics; Topics not covered in depth in BMIN 5010; Consensus of the program leadership and teaching faculty.

B. 2.0 CU MSBMI core courses

- **BMIN 5130: Quantitative Research Methods (Fall)** This course explores core principles, theories, and methods from epidemiology, causal inference, biostatistics, and data science, with an emphasis on their application to inform, address, and evaluate health systems-focused research questions and interventions. The ideal learner will have a general familiarity with data analysis, electronic medical records, and experience or planned health systems projects, and is likely a doctoral student, post-doctoral researcher, or faculty member; however, interested students may contact the professor to discuss. The course will cover a wide range of topics to enhance students' familiarity, literacy, and critical appraisal skills in health-system-based randomized trials (including cluster and pragmatic trials), quasi-experimental and observational study designs and methods (such as pre/post studies, differences-in-differences, and time series analysis), as well as general considerations related to multivariable regression modeling, measurement error, missing data, predictive modeling, data integration, and related and emerging topics in learning health system science. Additional topics will vary yearly based on the availability of guest lectures and student composition and needs and may include, for example, lectures on advanced methods (such as Bayesian statistics for clinical research and machine learning), scientific and grant writing, informed consent, and research ethics. Classes will be centered around instructor-led lectures, journal clubs, student-led presentations, case studies, and expert panels.

- **BMIN 6010: Advanced Special Topics in Biomedical Informatics** This course is designed to provide an in-depth look at several topics that are of essential or timely importance in biomedical informatics by examining historic and current peer-reviewed literature. Each topic will be allotted three to five consecutive weeks in the class schedule with the intention that each module becomes its own "mini-course". The course activities will be organized into two segments. In the first section, we will focus on reviewing, presenting, and writing about primary literature. In the second section, we will also expand our writing to include developing new questions and approaches.

C. 3.0 CU Concentration-specific courses

Students will enroll in the following courses based on their declared track within the MSBMI program:

	CSI	TBI	HAI
BMIN 5060: Standards and Clinical Terminologies	X		
BMIN 5070: Human-Computer Interaction	X		
BMIN 5200: Foundations of AI in Health	X	X	X
BMIN 5210: Advanced Methods and Health Applications in Machine Learning		X	X
BMIN 5220: Natural Language Processing for Health			X
GCB 5350: Introduction to Bioinformatics		X	

D. 1.0 CU Elective

- A list of approved electives is provided in Appendix B. This represents elective courses that have previously been approved by the Curriculum Committee on the basis of relevance to program goals. If you would like to take an elective that is not on this list, a request for review can be made by contacting Meg Tanjutco via email. All elective enrollment decisions should be made following consultation with your academic advisor.

E. 2.0 CU Thesis

- **BMIN 9990: Thesis**

All MSBMI students must complete the online HIPAA and CITI training modules required of all PSOM students.

Thesis

The thesis is the central research requirement for the degree. Planning for the thesis will begin early in the first semester of study. Students are required to engage in a research project of their own design under the supervision of their primary mentor. The primary mentor will help the student identify a feasible research question for the thesis. The thesis should consolidate students' knowledge of the principles and practice of biomedical informatics research. The thesis topic will be in the area of curricular concentration and address the CAHIIM competencies.

Trainees are required to complete a thesis that involves designing a research project, writing a formal research proposal, performing the study described in it, analyzing the data collected, summarizing the results in a publishable manuscript(s), and presenting and defending the thesis at a public seminar.

The thesis provides hands-on experience in formulating one or more research questions; searching the medical literature; translating research questions into an appropriate research design; assessing study feasibility; writing a detailed study protocol; designing data collection instruments; conducting the research, performing data analysis; and preparing a manuscript for publication.

The thesis is required to be in the form of a publishable manuscript for submission to an indexed, peer-reviewed journal. There will be opportunities for students to present their work at the annual Informatics Day

event, conducted by the PSOM Institute for Biomedical Informatics (IBI), as well as at national meetings, contingent on funding.

Mentorship and Student Advising

Each student will have three supervising mentors, working as a team with the student: A primary research mentor, an application domain mentor, and a research methods mentor. The primary mentor will be a faculty member with expertise in informatics, typically a Senior Fellow of the Institute for Biomedical Informatics (IBI). Currently, IBI has more than 90 Senior Fellows from across the University of Pennsylvania. The application mentor may be an informatician, but more often a faculty member in one of the Penn health schools who has expertise in a particular clinical or biomedical problem. The methods mentor may be an informatician, but could also be faculty in statistics/biostatistics, computer science, implementation science, or other programs or departments.

Master's Thesis Advisor

All MSBMI students will identify a primary thesis advisor during their first semester in the degree program. The thesis advisor serves in a similar role to a doctoral dissertation advisor, acting as the primary source of advising for the student's masters thesis.

MSBMI students will designate two additional thesis committee members, whom together with the thesis advisor will form the full thesis committee.

Students will identify a suitable thesis advisor under the guidance of their academic advisor during their first semester in the MSBMI program. It is the student's responsibility to contact their desired advisor and ask if they would be willing to serve in this capacity. Final approval will be given by MSBMI program leadership.

MSBMI students should meet regularly with their primary thesis advisor, likely increasing in frequency as the student nears their thesis defense. We encourage all thesis mentors to include MSBMI advisees as regular members of their research groups. Where applicable, this could include attendance at lab meetings, collaboration on projects led by other members of the research group, allowing the student to use a desk in the advisor's lab space, and others.

Master's Thesis Committee Member

All MSBMI students will identify - in addition to their primary Thesis Advisor - two additional thesis committee members in the following roles: (1) An application domain mentor, and (2) A research methods mentor. The application domain mentor may be an informatician, but more often a faculty member in one of the Penn health schools who has expertise in a particular clinical or biomedical problem. The methods mentor may be an informatician, but could also be faculty in statistics/biostatistics, computer science, implementation science, or other programs or departments. Together, the complete master's thesis committee consists of the primary thesis advisor, the application domain mentor, and the research methods mentor, and they serve a role analogous to that of a doctoral dissertation committee.

Students will be provided with a list of available thesis committee members and will select one from each of the two categories described above. Under the guidance of their academic advisor and/or primary thesis advisor, they will contact the desired committee members and ask if they are willing to serve in that role. Final approval of the full thesis committee will be given by program leadership.

MSBMI students should meet simultaneously with all members of their thesis committee as needed, but no less than once per semester. Ad-hoc (likely 1-on-1) meetings will often increase in frequency as the student nears their thesis defense.

Transfer Policy: MCI to MSBMI

Students currently enrolled in the Master of Clinical Informatics (MCI) program who wish to transfer to the

Master of Science in Biomedical Informatics (MSBMI) program must submit an official request to the Admissions Committee. As part of the transfer request, students are required to provide an updated transcript reflecting their academic performance in the MCI program.

The Admissions Committee will review each request holistically to determine eligibility for the MSBMI program. Approval will be based on academic standing, alignment of research interests with the MSBMI curriculum, and overall fit for the program's research-oriented training focus.

Certificate in Biomedical Informatics Program

The Certificate in Biomedical Informatics is for students seeking training in biomedical informatics but not at a degree level. It consists of the same four CUs in “Core BMI” courses required of all Masters-level students. The four-course sequence is designed to foster informatics literacy among the Penn community.

All certificate students must complete the online HIPAA and CITI training modules required of all PSOM students.

At present, only Penn and CHOP affiliates are eligible to apply for the certificate program. Our target students are clinical professionals or biomedical researchers working in a clinical-adjacent field who are looking for basic training in biomedical informatics.

The certificate program follows the same policies as the MCI program, except where otherwise specified.

Transfer Policy: BMI Certificate to MCI

Students who are currently enrolled in, or who have completed, a certificate program may apply to transition into the MCI program by the published application deadline.

Applications submitted after the deadline will not be automatically considered. However, late applications may be reviewed on a case-by-case basis and are subject to approval by the program.

Due to differences in the curricula, there is no formally established path to transition from the BMI Certificate Program to the MSBMI degree.

PSOM Clinical Informatics Area of Concentration Program

The Clinical Informatics Area of Concentration (AOC) program is designed to train medical students to think like clinician informaticists, capable of leveraging technology and data analytics to improve the way that we deliver health care.

As health systems become increasingly reliant on data and technology, clinical informatics—the application of informatics and information technology to deliver healthcare services—has emerged as an essential subdomain of medical knowledge. As such, we must now train physicians with dual expertise in clinical medicine and informatics who can adapt to, utilize, and improve healthcare information systems.

Program Objectives

1. Develop an understanding of important topics in clinical informatics, including health IT data structures, clinical decision support, human factors, QI, policy, and care delivery models.
2. Gain an appreciation for the top-to-bottom operations involved in driving a complex health system towards the forefront of health information technology.
3. Gain applied experience in developing and implementing technological solutions to improve the speed, ease, and efficiency of patient care throughout Penn Medicine.
4. Develop practical skills in Epic, project management, or programming.

Please refer to the section on Clinical Informatics MD Program for specific program requirements.

Faculty Director: John Holmes, PhD, FACE, FACMI

Faculty Advisors: Anthony Luberti, MD, Srinath Adusumalli, MD, MSHP, MBMI, FACC, Peter Gabriel, MD, MSE, Eugene Gitelman, MD

Coordinator: Meg Tanjutco

Time to Degree

The master's and certificate programs are designed primarily for part-time students but may be completed in as few as three semesters (18 months) for the MCI program, four semesters (24 months) for the MSBMI program or two semesters (8 months) for the BMI Certificate program. Government policies dictate that the total time to degree may not exceed 150% of the student's academic plan at the time of matriculation.

We expect most students to complete the program over the course of two to three years, but some students may complete the program in three semesters. Students may request an alternative plan of study to extend their planned time to degree. All students must complete the degree in four years. Failure to complete degree requirements will result in the student being dismissed from the program.

Some possible course plans are given below. MCI and MSBMI students should work with their academic advisor to establish an individually appropriate plan for their schedule, desired electives, and career goals.

MCI and BMI Certificate Programs

Full time:

	Fall	Spring	Summer
Year 1	BMIN 5010: Intro to BMI	BMIN 5020: Databases	Capstone Project
	BMIN 5030: Data Science	BMIN 5040: Special Topics in BMI	
		BMIN 5110: Learning Health Systems	
	BMIN 5070: Human Factors	BMIN 5060: Standards and Vocabularies	
	Elective	Elective	

Part time:

	Fall	Spring
Year 1	BMIN 5010: Intro to BMI	BMIN 5020: Databases
	BMIN 5030: Data Science	BMIN 5110: Learning Health Systems
		BMIN 5060: Standards and Vocabularies
Year 2	Elective	BMIN 5040: Special Topics in BMI
	BMIN 5070: Human Factors	Capstone Project
	Elective	

MSBMI Program

MSBMI students can complete the degree on either a part-time or a full-time basis. The following charts provide examples for course completion in each track based on either part- or full-time enrollment. All course completion plans should be discussed between MSBMI students and their academic advisor.

CSI concentration full-time program (two years to completion)

Year	Semester	Course	Course units
1	Fall	Introduction to Biomedical Informatics (BMIN 5010)	1
		Data Science (BMIN 5030)	1
		Foundations of AI in Health (BMIN 5200)	1
	Spring	Database and Data Integration in Biomedical Research (BMIN 5020)	1
		Standards and Vocabularies (BMIN 5060)	1
		Quantitative Research Methods (BMIN 5130)	1
2	Fall	Human-Computer Interaction (BMIN 5070)	1
		Elective	1
		Thesis	1
	Spring	Advanced Special Topics in Biomedical Informatics (BMIN 6010)	1
		Informatics Research Methods for Learning Health Systems (BMIN 5110)	1
		Thesis	1
		Total course units required for the MSBMI degree	**12**

CSI concentration part-time program (three years to completion)

Year	Semester	Course	Course units
1	Fall	Introduction to Biomedical Informatics (BMIN 5010)	1
		Data Science (BMIN 5030)	1
	Spring	Database and Data Integration in Biomedical Research (BMIN 5020)	1
		Informatics Research Methods for Learning Health Systems (BMIN 5110)	1
2	Fall	Quantitative Research Methods (BMIN 5130)	1
		Standards and Vocabularies (BMIN 5060)	1
	Spring	Human-Computer Interaction (BMIN 5070)	1
		Elective	1
3	Fall	Foundations of AI in Health (BMIN 5200)	1
		Thesis	1
	Spring	Advanced Special Topics in Biomedical Informatics (BMIN 6010)	1
		Thesis	1
		Total course units required for the MSBMI degree	**12**

TBI concentration full-time program (two years to completion)

Year	Semester	Course	Course units
1	Fall	Introduction to Biomedical Informatics (BMIN 5010)	1
		Data Science (BMIN 5030)	1
		Foundations of AI in Health (BMIN 5200)	1
	Spring	Database and Data Integration in Biomedical Research (BMIN 5020)	1
		Special Topics in Biomedical and Health Informatics (BMIN 5040)	1
		Quantitative Research Methods (BMIN 5130)	1
2	Fall	Introduction to Bioinformatics (GCB 5350)	1
		Elective	1
		Thesis	1
	Spring	Advanced Special Topics in Biomedical Informatics (BMIN 6010)	1
		Advanced Methods in Machine Learning (BMIN 5210)	1
		Thesis	1
		Total course units required for the MSBMI degree	**12**

TBI concentration part-time program (three years to completion)

Year	Semester	Course	Course units
1	Fall	Introduction to Biomedical Informatics (BMIN 5010)	1
		Data Science (BMIN 5030)	1
	Spring	Database and Data Integration in Biomedical Research (BMIN 5020)	1
		Special Topics in Biomedical and Health Informatics (BMIN 5040)	1
2	Fall	Foundations of AI in Health (BMIN 5200)	1
		Introduction to Bioinformatics (GCB 5350)	1
	Spring	Quantitative Research Methods (BMIN 5130)	1
		Advanced Methods in Machine Learning (BMIN 5210)	1
3	Fall	Elective	1
		Thesis	1
	Spring	Advanced Special Topics in Biomedical Informatics (BMIN 6010)	1
		Thesis	1
		Total course units required for the MSBMI degree	**12**

HAI concentration full-time program (two years to completion)

Year	Semester	Course	Course units
1	Fall	Introduction to Biomedical Informatics (BMIN 5010)	1
		Data Science (BMIN 5030)	1
		Foundations of AI in Health (BMIN 5200)	1
	Spring	Database and Data Integration in Biomedical Research (BMIN 5020)	1
		Special Topics in Biomedical and Health Informatics (BMIN 5040)	1
		Quantitative Research Methods (BMIN 5130)	1
2	Fall	Natural Language Processing for Health (BMIN 5220)	1
		Elective	1
		Thesis	1
	Spring	Advanced Special Topics in Biomedical Informatics (BMIN 6010)	1
		Advanced Methods in Machine Learning (BMIN 5210)	1
		Thesis	1
		Total course units required for the MSBMI degree	**12**

HAI concentration part-time program (three years to completion)

Year	Semester	Course	Course units
1	Fall	Introduction to Biomedical Informatics (BMIN 5010)	1
		Data Science (BMIN 5030)	1
	Spring	Database and Data Integration in Biomedical Research (BMIN 5020)	1
		Special Topics in Biomedical and Health Informatics (BMIN 5040)	1
2	Fall	Foundations of AI in Health (BMIN 5200)	1
		Natural Language Processing for Health (BMIN 5220)	1
	Spring	Quantitative Research Methods (BMIN 5130)	1
		Advanced Methods in Machine Learning (BMIN 5210)	1
3	Fall	Elective	1
		Thesis	1
	Spring	Advanced Special Topics in Biomedical Informatics (BMIN 6010)	1
		Thesis	1
		Total course units required for the MSBMI degree	**12**

PSOM and University Policies

Student Conduct

Students must comply with the University's Code of Student Conduct and other University policies related to student conduct that appears in The PennBook: Resources, Policies and Procedures Handbook. These include, but are not limited to, policies on sexual harassment, acquaintance rape and sexual violence, appropriate use of electronic resources, open expression, and drug and alcohol usage. Students are also expected to abide by the policies adopted by PMCP as well as University Policies relevant to Graduate Education. Further information regarding University policies can be found in the Pennbook at https://catalog.upenn.edu/pennbook/.

Any student who exhibits unprofessional behavior as determined by program leadership will be evaluated for probation. Continued unprofessional behavior will be grounds for removal from the program.

Responsible Student Conduct

Penn recognizes that people are the most important resource for achieving eminence in accomplishing our mission in the areas of teaching, research, community service, and patient care. Penn is an institution that values academic freedom, diversity and respect for one another. Penn is committed to the principle of non-discrimination and does not tolerate conduct that constitutes harassment on any basis, including sexual, racial, ethnic, religious, or gender harassment.

A complete list of 10 principles of responsible conduct are available through the Office of Audit, Compliance and Privacy, accessible here: https://oacp.upenn.edu/oacp-principles/respect-for-others-in-the-workplace/

Code of Academic Integrity

The most fundamental value of any academic community is intellectual honesty; accordingly, all academic communities rely upon the integrity of each and every member. Students are responsible not only for adhering to the highest standards of truth and honesty but also for upholding the principles and spirit of the Academic Code. Violations of the Code include but are not limited to the following acts:

A. Cheating: Using or attempting to use unauthorized assistance, material or study aids in examinations or any other academic work, or preventing, or attempting to prevent another from using authorized assistance, material, or study aids. Example: using a cheat sheet in a quiz or exam, altering a graded exam and resubmitting it for a better grade, etc.

B. Plagiarism: Using the ideas, data or language of another without specific and proper acknowledgment. Example: copying another person's paper, article, or computer work and submitting it for an assignment, cloning someone else's ideas without attribution, failing to use quotation marks where appropriate, etc.

C. Fabrication: Submitting contrived or altered information in any academic exercise. Example: making up data for an experiment, fudging data, citing nonexistent articles, contriving sources, etc.

D. Multiple Submission: Submitting, without prior permission, any work submitted to fulfill another academic requirement.

E. Misrepresentation of Academic Records: Misrepresenting or tampering with or attempting to tamper with any portion of one's own or any other person's transcripts or academic record, either before or after coming to the University of Pennsylvania. Example: forging a change of grade slip, tampering with computer records, falsifying academic information on one's resume, etc.

F. Facilitating Academic Dishonesty: Knowingly helping or attempting to help another violate provisions of this Code. Example: working together on a take-home exam, etc.

G. Unfair Advantage: Attempting to gain unauthorized advantage over fellow students in an academic exercise. Example: gaining or providing unauthorized access to examination materials, obstructing or interfering with another student's efforts in an academic exercise, lying about a need for an extension for an exam or paper, continuing to write even when time is up during an exam, destroying or keeping library materials for one's own use., etc.

If a student is unsure whether his action(s) constitute a violation of the Code of Academic Integrity, then it is that student's responsibility to consult with the instructor to clarify any ambiguities. Students and faculty are expected to be familiar with the Code as articulated in the Pennbook:

https://catalog.upenn.edu/pennbook/code-of-academic-integrity/.

Code of Student Conduct

https://catalog.upenn.edu/pennbook/code-of-student-conduct/.

University of Pennsylvania Equal Opportunity and Nondiscrimination Statement

https://catalog.upenn.edu/pennbook/nondiscrimination-statement/

Sexual Misconduct Policy, Resource Offices and Complaint Procedures

https://catalog.upenn.edu/pennbook/sexual-misconduct-resource-offices-complaint-procedures/.

Student Grievance Procedure

https://catalog.upenn.edu/pennbook/student-grievance/.

Financial Policies

https://catalog.upenn.edu/pennbook/financial-policies/.

Authorship

Students are required to adhere to the guidelines as set forth by the University of Pennsylvania Perelman School of Medicine Authorship Policy, including qualifications for authorship, the authors and responsibilities, and disclosure of funding and potential conflicts of interests: https://www.med.upenn.edu/evdresearch/assets/user-content/documents/2_Announcement_MemoLJLRE_PerelmanSchoolofMedicineAuthorshipPolicy.pdf.

Tuition and Fees

Tuition is calculated based on course unit plus general and technical fees. Tuition for non-MXX courses vary by department in the summer term and students should contact the individual department to verify tuition

cost. For current tuition rates, visit https://srfs.upenn.edu/costs-budgeting/med/masters.

Description of Fees

- **General Fee:** A General Fee is assessed to all undergraduate, graduate, and professional students, and directly funds Penn's non-instructional student support services.
- **Technical Fee:** The Technology Fee is used to cover technology-driven services, including library electronic research tools, course portal, and use of email accounts.
- **Clinical Fee:** Full-time students (enrolled in more than 2 CUs in a term) are required either to pay a separate Clinical Fee for access to the Student Health Service or to enroll in a health insurance plan that provides a capitated payment to the Student Health Service (i.e., the Penn Student Insurance Plan or a private plan that provides and equivalent capitated payment).

A review of the Penn Student Insurance Plan can be found at the following website: https://shs.wellness.upenn.edu/psipinsurance/.

Supplemental Financial Policies

All students are billed per course unit (CU) up to 3CU. At 3CU, the General Fee and Technology Fee are billed at a flat rate and will not increase after 3CU. Tuition will not be billed at a flat rate.

At 3CU, a student is considered full-time and is eligible for access to campus recreation spaces. Full-time students will be billed a Clinical Fee each term, which provides access to Student Health Services. Students who are full-time employees—at Penn or elsewhere—and have health insurance through their employer should notify the program so that the Clinical Fee may be removed; Penn employees do not have access to Student Health Services.

Registration

Registration Process

Students are responsible for registering for courses by submitting a permission request of the courses you plan to take for the upcoming semester using Path@Penn, the online registration system (accessible via https://path.at.upenn.edu/).

Continuous Registration

Continuous registration as a master's or certificate student is required for Fall and Spring terms. Students who do not plan to register during mandatory terms should request a leave of absence.

Leave of Absence

A student who wishes to take a leave of absence should contact the Program Coordinator.

A student may request a leave of absence at any time and may be granted by the program director for up to one year with the possibility of renewal. A leave of absence will be granted for military duty, medical reasons, and for family leave; this leave is typically for up to one year and "stops the clock" on time to completion. Personal leave for other reasons may be granted for up to one year with the approval of the Program Director, but it does not automatically change the time limit.

Upon requesting a leave of absence, a student should complete the form with an estimated date of return. Failing to register for coursework without permission from the University does not constitute a leave of absence. If the student requests leave after the start of the term, all normal drop and withdrawal policies

apply.

When returning from a leave, students will contact their program at least thirty days before the start of the term in which they plan to return to confirm they are returning. If a student fails to return from leave within the set time limit or request a renewal, they will be dismissed from the program.

Leave of absence will affect any student loans—either those sought to pay for the degree or those from a previous academic career. This may include loans going into repayment before the end of the leave. Students are encouraged to talk to Student Registration and Financial Services prior to taking a leave of absence to ensure they have planned for shifting financial responsibility.

Registration Timeline

Student registration may be adjusted through Path@Penn through the end of the Course Selection Period for each term, as listed in the term Academic Calendar. After the Course Selection Period ends, registration adjustments must be requested through the program administrators. There will be a financial penalty assessed for dropping a course after the Course Selection Period, following the scheme below:

Drop on or before the Course Selection Period ends	100% reduction of tuition & fees[1]
Drop after the Course Selection Period ends and before the Drop Deadline	50% reduction of tuition & fees[1]
Drop after the Drop Deadline and before the Withdrawal Deadline	0% reduction in tuition & fees[1] Mark of 'W' added to the transcript
Drop after the Withdrawal Deadline	0% reduction in tuition & fees[1] Mark of 'WF' on the transcript, indicating Withdrawal with Failure

Note to students with Penn Faculty / Staff Tuition Benefits: Tuition benefits are calculated based on the number of registered CU and are adjusted in accordance with registration. Tuition benefits will not cover partial tuition & fees left on the bill as a result of dropping a course after the Course Selection Period ends. The portion of tuition and fees remaining on the bill after courses have been dropped are the student's responsibility.

Billing & Payment

Access & Pay Your Student Bill: https://srfs.upenn.edu/billing-payment/pennpay

- University Billing Schedule: https://srfs.upenn.edu/billing-payment/billing-schedule
- Penn Tuition Benefit: https://www.hr.upenn.edu/PennHR/benefits-pay/tuition/tuition-benefits-for-faculty-and-staff
- Third Party Payment: https://srfs.upenn.edu/billing-payment/third-party-payment

Grading

The grading system is as follows: A, excellent; B, good; C, fair; D, poor; and F, failure. The grade of C, while passing, does not constitute satisfactory performance. Letter grades may be modified by a plus (+) or minus (-) sign at the discretion of the course director. The minimum standard for satisfactory work in each course is a B-, and students must maintain a cumulative GPA of 3.0 to remain in good standing. A grade of C+ or lower must be remediated, pursuant to the policy on Grade Remediation. The master's and certificate programs additionally require that the quality of the students work and their conduct in the program is of an appropriate professional quality to ensure advancement. Failure to meet these requirements may result in a student being

[1] Tuition & fees refers to Tuition, General Fee, and Technology Fee. Clinical Fee is separate and is only removed when registration is below 3CU. Clinical Fee will be removed through the Drop Deadline but not afterward.

placed on probation and/or require a student to withdraw despite a satisfactory grade average.

The grading system converts letter grades to a GPA on the 4.0 scale:

A+	4.0
A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
D-	0.7
F	0.00

The grade "I" is used to designate "incomplete." A student who fails to complete a course and does not withdraw or change his/her status to auditor within the prescribed period shall receive at the instructor's discretion either a grade of I (incomplete) or F (failure). It is expected, in general, that a student shall complete the work of a course during the term in which that course is taken. The instructor may permit an extension of time up to one year for the completion of the course. In such cases, any course which is still incomplete after one calendar year from its official ending must remain as "incomplete" on the student's record and shall not be credited toward a degree.

The notation of GR or NR will appear when grades are delayed and will be amended when the grades are submitted.

Audit Policy

Students who wish to audit a course are expected to designate the audit at the time of registration. It is important to note that students who audit a course must pay tuition, but they will not receive credit towards their degree. If a student wishes to change a course status from credit to audit, they must obtain permission from the course instructor before the "course selection" period ends. The audited course will appear on the transcript with the grade of "AUD" and no credit will be earned toward graduation. Students are not permitted to change the course status from graded to audit after the course has ended.

Academic Standing & Probation

The MCI, MSBMI, and BMI Certificate programs have specific academic standards that are expected of all students. Students are encouraged to communicate and meet regularly with program leadership to discuss academic progress. If a student fails to obtain a passing grade (B-or higher) for a required course, he/she will be placed on academic probation. When placed on Academic Probation, the student may be unable to register for coursework or access transcripts. Students will be notified of their probation status through written communication. The program leadership will work with the student to develop a plan for academic success. Students may take a leave of absence, during which the student may complete remedial or missing coursework. Upon request, students will receive continued access to library and academic resources during their leave. Students may continue to enroll in other courses while on probation with the permission of the

Program Director and input from the course director, as needed. The student must make arrangements to retake, or take an approved equivalent of, any course in which they receive a grade lower than a B-. A cumulative GPA lower than 3.0 will also result in academic probation. Arrangements for remediation must be approved by the Program Director with input from the Advising and Curriculum Committee as needed.

Core courses with a C+ or lower must be retaken; electives with a C+ or lower may be retaken or replaced. Retaken and/or replacement courses will result in tuition charges. When a student retakes a course, the second instance of the course will be marked as a Repeat. Both the original instance of the course and the retaken instance of the course will appear on the transcript with their respective grades. The grade and course units from the original course will factor into the GPA. The retaken course will be used to satisfy graduation requirements. When a student replaces an elective course with a new elective, both courses will appear on the transcript, but only the better of the two counts toward GPA and the degree.
Any student who receives an unacceptable grade in a course for the second time will be dismissed and will not be eligible for re-admission. The status of any student who is or has previously been on probation and who receives an unacceptable grade for an additional course will be reviewed by the Advising and Curriculum Committee and the Program Director. The committee is authorized to dismiss the student or allow the student to remain in the program on a probationary status.

Any student who exhibits unprofessional behavior as determined by the programmatic leadership will be evaluated for probation. Continued unprofessional behavior will be grounds for removal from the program.

Transfer Credit Policy (MCI Students Only)

Transfer credit can be given for coursework completed outside of the degree currently pursued. This coursework may be completed at Penn, in pursuit of another degree, (called internal transfer credit) or at another institution (called external transfer credit). All transfer of credit requests will be considered on a case-by-case basis. Transfer credit may be accepted for electives, only with program approval.

Transfer credit may not be applied to the Capstone Project. Courses taken on a pass/fail basis will not be considered for transfer credit. Only courses in which the student received a grade of "B" (3.0) or higher will be considered for transfer credit. No course may be counted toward degree requirements if it has been used toward the requirements for more than one other degree. A maximum of 2 course units outside of the MCI program may be transferred.

The usual time a course may be valid for transfer is three years from the completion of the course until the time of matriculation. Requests for transfer credit should be submitted to the Program Director together with a course syllabus for the course under consideration. The director will request a review of the course by the Curriculum Committee for its appropriateness for transfer credit.

Students may request substitution of a core course with a more advanced course in that content area. The process for substitution is the same as that for transfer credit.

To receive transfer credit for a course taken at Penn (internal transfer), the course must be at the graduate level, must be taken for a grade, and must have a grade of B or better. Transfer credit from programs at Penn other than the Veterinary, Dental, and MD Program will factor into the GPA. Students should speak with their academic advisor and program staff to request transfer credit and initiate the process.

To receive transfer credit for a course not taken at Penn (external transfer), the course must be at the graduate level, must be taken as part of a graduate program, must be taken for a grade, and must have a grade of B or better. External transfer credit does not factor into GPA but counts toward the CUs required for degree completion. Students requesting external transfer credit must provide a) a syllabus for the course b) an official copy of their transcript from that institution displaying a grade for the course. The program will evaluate the request and assign the appropriate credit to the course.

Transfer credit should be requested no later than the start of the term in which a student expects to graduate, though sooner is preferred. No more than two course units for the degree may be transfer credit.

Graduation

The Master's degree is conferred by the University of Pennsylvania's Perelman School of Medicine and is granted in May, August, or December. In order to be considered for conferral of the degree, a student must complete a "graduation application" approximately three months prior to the expected conferral date. Prior to each graduation period, the program office will email details and deadlines to all eligible candidates.

Voluntary Withdrawal from Program

Students may withdraw from their program at any time. Please contact your program for the appropriate form to commence official withdrawal proceedings. Students who are considering withdrawal are strongly encouraged to meet with their Program Director to discuss their situation and options. Students are responsible for dropping all registered courses in the semester they wish to withdraw to effectively stop the billing process (in other words, withdrawal from the program does *not* automatically cancel course registration). Students are responsible for all tuition charges and other financial obligations to the University incurred prior to the effective date of withdrawal. Once students have withdrawn, they may reapply for admission under the program's application portal. Credit completed prior to readmission will be reviewed as transfer credit under the program's transfer credit policy.

Drop from Program

A student may be dropped from their program for reasons listed below. Like a voluntary withdrawal, students will be responsible for any charges or financial obligations to the University incurred before the effective date of the drop.

1. Time Limit: Students are expected to complete their degree within four years of matriculation. Should a student fail to complete their degree within the time limit, the program may drop the student.
2. Academic Progress: Students are expected to maintain continuous registration, maintain a GPA of at least 3.0, carry incomplete marks for no more than a year, and achieve grades of B or better in all coursework. If a student does not meet these criteria, they may be placed on probation—with an opportunity to remediate issues with their progress—or dropped from the program.
3. Academic Integrity: Students are expected to follow the University Code of Academic Integrity. Violations of this code may result in the student being dropped from the program.
4. Student Conduct: Students are expected to follow the University Code of Student Conduct. Violations of this code may result in the student being dropped from the program.

A student dropped from their program will receive a letter stating that they have been dropped along with the reason for their drop.

Academic Grievances

Teaching faculty have the authority to make academic judgments in relation to their students. Therefore, if a graduate student wishes to have an evaluation, exam, or course grade reviewed, they must first discuss the matter with their instructor. Should the student and instructor not find a satisfactory resolution, or should a discussion prove impossible, the student may submit a request in writing to the Program Director.

Should the matter not be resolved with the aid of the Program Director, students may ask that their request be elevated to the Associate Dean for PSOM Master's and Certificate Programs for further review. The role of the Associate Dean is to ensure that the Program has arranged for a proper review of the matter and that the evaluation was fair and impartial and in accordance with relevant University policies.

International Students

International Student & Scholar Services (ISSS) provides information and guidance on the regulations and laws required to remain in the U.S. legally. Information on pre-arrival, immigration documents, orientation,

enrollment, travel information, employment, transfers and counseling related to adjusting to academia and life in University of Pennsylvania are just a few of the services provided. Please visit the ISSS Website for more information.

Administrative Requirements

Throughout the program, students will be required to keep track of and follow through on all administrative requirements. Below is a summarized list of the requirements:

1. Graduation application – In order to be considered for conferral of the degree students must complete an online graduation application approximately two months prior to the expected conferral date. The graduation application initiates an academic audit that, assuming all requirements are met, places the student with the next graduation cohort. The MCI degree is conferred by the University of Pennsylvania Perelman School of Medicine and is granted in May, August, and December of each year.
2. Course evaluations – students are required to complete an evaluation for every course. Students will receive an email notification and website link to the online evaluation at the end of each term. Grades will not be released until evaluations are complete.

Research Regulations Compliance

Because much of the research conducted by our students involves clinical data, it is essential that all studies comply with various research regulations. These policies are designed to protect patient and human subject privacy.

Penn Systems

PennCard

PennCard is the official identification card of the University of Pennsylvania and is required for all students. The PennCard Center is located on the 2nd floor of the Penn Bookstore at 3601 Walnut Street. A valid government issued photo I.D. will be required in order to pick up your new PennCard. The Office can be reached at http://www.upenn.edu/penncard**.**

PennKey

Your PennKey name and password gives you access to PennNet, a Penn e-mail account, and many other essential services managed through the Masters and Certificate Programs. All students are required to have a current, active PennKey and password.

Path@Penn

Path@Penn is your main hub for information about your academic records, financial aid, and student profile. It provides access to the academic and financial information students need to succeed, as well as the tools they will use to register for classes.

The first time you log in to Path@Penn, please verify your Personal Information and your Emergency Contacts. If you need help, visit the Path@Penn web page and access Student Quick Reference Guide.

Canvas

Canvas is the online course site system used for the majority of courses and by the University. Individual pages are set up for each course and can be accessed with PennKey and Password. Log in at https://canvas.upenn.edu. Support: canvas@pobox.upenn.edu

University Resources

Graduate Student Center

Many resources are available to students via the Graduate Student Center (http://www.gsc.upenn.edu/) including:

- New Student Orientation: https://gsc.upenn.edu/resources/new-students
- Wellness at Penn: https://gsc.upenn.edu/resources/wellness
- Family Center at Penn: https://familycenter.upenn.edu/

Weingarten Learning Resources Center

https://www.vpul.upenn.edu/lrc/

Counseling and Psychological Services (CAPS)

https://caps.wellness.upenn.edu/

Administrative Structure

The Master of Clinical Informatics and Biomedical Informatics Certificate Programs fall under the academic umbrella of the Perelman School of Medicine (PSOM) Penn Medicine Masters and Certificate Programs office (PMCP) (http://www.med.upenn.edu/masters.shtml) within the Office of the Vice Dean for Research and Research Training. The administrative home for the MCI, MSBMI, and BMI Certificate programs is the Institute for Biomedical Informatics (IBI).

Program Director

The Program Director is responsible for administrative oversight and academic leadership of the program. The Director also serves as a primary academic advisor to students and is the chairperson of the Admissions Committees. The current Program Director is John H. Holmes, PhD.

The Executive Committee

The Executive Committee comprises the Director and Associate Director for Medical Informatics of the Institute for Biomedical Informatics, as well as additional informatics-related faculty from the Perelman School of Medicine and the School of Nursing. The committee oversees the functioning of the MCI, MSBMI, and BMI Certificate programs, including an annual review of the programs, the Student and Faculty Handbooks, ratifying the selection of the Chairs and members of the Steering, Admissions, and the Advising and Curriculum Committees. The Executive Committee also adjudicates any formal written student appeals related to coursework. The Executive Committee may identify and recommend approaches for integration of the MCI program with others on campus, approval of major changes in policy, and degree requirements.

Admissions Committee

The Admissions Committee will evaluate prospective students and is responsible for all admissions decisions. Members of the committee are selected to represent a broad range of expertise relevant to clinical informatics and curriculum. The Admissions Committee reviews applications from prospective students, selects the most promising applicants for interviews and recruitment, and subsequently, with final approval from Program Director, identify those who will be offered admission. The Admissions Committee is responsible for organizing and implementing recruitment processes, as appropriate.

Advising and Curriculum Committee

The Advising and Curriculum Committee has twofold responsibility. First, it is charged with helping students select courses, capstone advisors, and approving capstone project proposals.

The committee is also the first level of support for students experiencing difficulties with the program. Issues that the committee is not able to resolve with the student are escalated to the Executive Committee. The Advising and Curriculum committee meets at least once each semester to review student progress, provide advice on course availability and selection and suggest improved programs to ensure student success.

Second, the Advising and Curriculum Committee is charged with overseeing and providing guidance for the development and maintenance of the curriculum. In this role, the committee considers major or minor revisions to the curriculum, and reviews course evaluations and suggests approaches for remediation as needed. Changes to the curriculum will be approved by the Advising and Curriculum Committee, and then presented to the Executive Committee for approval, which will in turn provide a report to the Steering Committee before any curriculum changes are implemented. Members of the committee are selected to

represent a broad range of expertise relevant to clinical informatics and the curriculum.

Faculty Mentors and Advising Roles

Master's Thesis Advisor (MSBMI degree)

All MSBMI students will identify a primary thesis advisor during their first semester in the degree program. The thesis advisor serves in a similar role to a doctoral dissertation advisor, acting as the primary source of advising for the student's masters thesis.

MSBMI students will designate two additional thesis committee members (see below), whom together with the thesis advisor will form the full thesis committee.

Master's Thesis Committee Member (MSBMI degree)

All MSBMI students will identify - in addition to their primary Thesis Advisor - two additional thesis committee members in the following roles: (1) An application domain mentor, and (2) A research methods mentor. The application domain mentor may be an informatician, but more often a faculty member in one of the Penn health schools who has expertise in a particular clinical or biomedical problem. The methods mentor may be an informatician, but could also be faculty in statistics/biostatistics, computer science, implementation science, or other programs or departments. Together, the complete master's thesis committee consists of the primary thesis advisor, the application domain mentor, and the research methods mentor, and they serve a role analogous to that of a doctoral dissertation committee.

Capstone Advisor (MCI degree)

Each project is supervised by an IBI Senior Fellow, selected by the student and vetted by the Advising Committee. The Capstone Advisor will be selected by the student for expertise in the topic addressed in the capstone. Additional individuals with expertise relating to the student's project can join the advisory team as needed. The Capstone Advisor will be responsible for ensuring a high degree of quality of the project and the student's work thereupon. The Capstone Advisor will be responsible for guiding and evaluating the student's progress throughout the semester, and for submitting the final evaluation and a grade. This grade is then used as part of the overall capstone grade.

Academic Advisor (MSBMI and MCI degrees)

All MSBMI and MCI students are assigned an academic advisor at the start of the degree program. The academic advisor should be separate from the thesis primary advisor (MSBMI students) and capstone mentor (MCI students).

Academic advisors provide general guidance to trainees as they progress through the MSBMI and MCI degree programs, including but not limited to progress towards the degree, advice in registering for courses, selection of electives, and how to optimize the degree program in terms of future career goals. They also can provide general academic advice and help students connect with other individuals Penn and elsewhere to advance their careers.

Unlike capstone mentors and thesis advisors, academic advisors are expected to hold general expertise in biomedical informatics, but not necessarily domain expertise in the student's area of research/clinical interest.

Part II: Faculty Handbook

Office of the Provost: Faculty Handbook

General information about Penn academic policies can be found in the Faculty Handbook: https://provost.upenn.edu/faculty.

Principles of Responsible Conduct

Penn recognizes that people are the most important resource for achieving eminence in accomplishing our mission in the areas of teaching, research, community service, and patient care. Penn is an institution that values academic freedom, diversity and respect for one another. Penn is committed to the principle of non-discrimination and does not tolerate conduct that constitutes harassment on any basis, including sexual, racial, ethnic, religious, or gender harassment.

A complete list of 10 principles of responsible conduct is available through the Office of Audit, Compliance and Privacy, accessible here: https://oacp.upenn.edu/oacp-principles/respect-for-others-in-the-workplace/.

Academic Calendars / Course Scheduling

The University of Pennsylvania Academic Calendars

https://almanac.upenn.edu/penn-academic-calendar

Please note that there may be some PSOM- or MCI/MSBMI- specific dates that are not represented in the university-wide calendar. If you have any questions, please contact the MCI and MSBMI Program Coordinator.

Policy on Secular and Religious Holidays

https://catalog.upenn.edu/pennbook/secular-religious-holidays/.

Calendar of Secular and Religious Holidays

https://chaplain.upenn.edu/worship/holidays/.

Final Exam Information

https://srfs.upenn.edu/registration-catalog-calendar/final-exams.

Academic Breaks

The MCI and MSBMI programs observe all standard Penn academic breaks (summer, fall, winter, and spring).

Suspension of Normal Operations / University Closures

In the event of snow or a weather-related emergency, the University will announce a closing or modification of work schedules via the emergency information number (215-898-6358). Please keep in mind that classes that are missed due to University closures may have to be made up to meet the course hour requirements. If you need assistance rescheduling a canceled class, please contact MCI and MSBMI Program Coordinator.

The University of Pennsylvania also provides Snow Day Care. Snow Day Child Care provides all-day care for children of Penn faculty and staff members when the University is open, and Philadelphia schools are closed* due to inclement weather as space permits. Children from all school districts are welcome; however, may be subject to regular rates if the Philadelphia schools are open. Preference is given to children of Penn faculty and staff. Please visit the following link to get more information and access mandatory forms for pre-registration: http://cms.business-services.upenn.edu/childcare.

General information regarding suspension of normal operations can be found here: Suspension of Normal Operations.

Program Committees

Executive Committee

The Executive Committee is comprised of the Director and Associate Directors of the IBI Educational Programs, as well as additional informatics-related faculty from the Perelman School of Medicine and potentially other health-related schools across Penn. The committee oversees the functioning of the MCI and MSBMI programs, including an annual review of the program, the Student and Faculty Handbooks, ratifying the selection of the Chairs and members of the Admissions and the Advising and Curriculum Committees. The Executive Committee also adjudicates any formal written student appeals related to coursework. The Executive Committee may identify and recommend approaches for integration of the MCI and MSBMI programs with others on campus, approval of major changes in policy, and degree requirements.

MCI and MSBMI Executive Committee

John H. Holmes, PhD, FACE, FACMI Director, IBI Educational Programs	Chair of Executive Committee Associate Director for Medical Informatics, IBI Director of Educational Programs Professor of Medical Informatics in Epidemiology, PSOM
Robert W. Grundmeier, MD	Associate Professor of Pediatrics, PSOM and CHOP
C. William Hanson, III, MD	Professor of Anesthesiology and Critical Care
Charles E. Kahn, Jr., MD, MS, FACR, FACMI	Professor of Radiology, PSOM
Dokyoon Kim, PhD Associate Director, IBI Educational Programs	Associate Professor of Informatics Director, Center for AI-Driven Translational Informatics (CATI) Associate Director of Informatics, Immune Health
Anthony Luberti, MD	Clinical Professor of Pediatrics, Medical Director, Informatics Education, Department of Biomedical and Health Informatics, PSOM and CHOP
Danielle L. Mowery, PhD	Chief Research Information Officer, Assistant Professor of Informatics, PSOM
Joseph Daniel Romano, PhD, MPhil, MA, FAMIA Associate Director, IBI Educational Programs	Assistant Professor of Informatics and Pharmacology

Admissions Committee

The Admissions Committee will evaluate prospective students and is responsible for all admissions decisions. Members of the committee are selected to represent a broad range of expertise relevant to clinical informatics and the MCI and MSBMI curricula. The Admissions Committee reviews applications from prospective students, selects the most promising applicants for interviews and recruitment, and subsequently, with final approval from Program Director, identify those who will be offered admission. The Admissions Committee is responsible for organizing and implementing recruitment processes, as appropriate.

MCI and MSBMI Admissions Committee

Joseph Daniel Romano, PhD, MPhil, MA, FAMIA Associate Director, IBI Educational Programs	Chair of Admissions Committee Assistant Professor of Informatics and Pharmacology
Daniel S. Herman, MD, PhD	Assistant Professor of Pathology and Laboratory Medicine
John H. Holmes, PhD, FACE, FACMI Director, IBI Educational Programs	Associate Director for Medical Informatics Director of Educational Programs Professor of Medical Informatics in Epidemiology
Dokyoon Kim, PhD Associate Director, MSBMI Program	Associate Professor of Informatics, Department of Biostatistics, Epidemiology & Informatics Director, Center for AI-Driven Translational Informatics (CATI) Associate Director of Informatics, Immune Health
Anthony Luberti, MD	Clinical Professor of Pediatrics, Medical Director, Informatics Education, Department of Biomedical and Health Informatics, PSOM and CHOP
Stephen R. Master, MD, PhD	Associate Professor of Pathology and Laboratory Medicine, CHOP
John D. McGreevey, III, MD	Associate Professor of Clinical Medicine, PSOM and Associate Chief Medical Information Officer, UPHS

Advising and Curriculum Committee

The Advising and Curriculum Committee has a twofold responsibility. First, it is charged with helping students select courses, capstone advisors, and approving capstone project proposals.

The committee is also the first level of support for students experiencing difficulties with the program. Issues that the committee is not able to resolve with the student are escalated to the Executive Committee. The Advising and Curriculum committee meets at least once each semester to review student progress, provide advice on course availability and selection and suggest improved programs to ensure student success.

Second, the Advising and Curriculum Committee is charged with overseeing and providing guidance for the development and maintenance of the MCI and MSBMI curricula. In this role, the committee considers major or minor revisions to the curriculum, and reviews course evaluations and suggests approaches for remediation as needed. Changes to the curriculum will be approved by the Advising and Curriculum Committee, and then presented to the Executive Committee for approval, which will in turn provide a report to the Steering Committee before any curriculum changes are implemented. Members of the committee are selected to represent a broad range of expertise relevant to clinical informatics, MCI and MSBMI curricula.

MCI and MSBMI Advising and Curriculum Committee

Dokyoon Kim, PhD Associate Director, IBI Educational Programs	Chair of Advising and Curriculum Committee Associate Professor of Informatics Director, Center for AI-Driven Translational Informatics (CATI) Associate Director of Informatics, Immune Health
Tessa Cook, MD, PhD	Assistant Professor of Radiology
Alexander Fiks, MD, MSCE	Professor of Pediatrics, PSOM and CHOP
John H. Holmes, PhD, FACE, FACMI, Director, MCI Program	Associate Director for Medical Informatics Director, IBI Educational Programs Professor of Medical Informatics in Epidemiology
Charles E. Kahn, Jr., MD, MS, FACR, FACMI	Professor of Radiology
Joseph Daniel Romano, PhD, MPhil, MA, FAMIA Associate Director, IBI Educational Programs	Assistant Professor of Informatics and Pharmacology

Program Advisors and Mentors

IBI Senior Fellows are invited to volunteer for each of the following roles based on their interest and availability. Program leadership will distribute a survey each summer to update the lists of IBI faculty available in each role, which will be provided to MSBMI and MCI students. Assignments for Academic Advisor roles will be made without student involvement. Assignments for all other roles (Master's Thesis Advisor, Master's Thesis Committee Member, and Capstone Advisor) will be initiated by students reaching out to desired advisors directly.

Please note that volunteering for a role simply indicates that you are generally available to serve in that capacity, and that no specific advising/mentoring assignments will be made without your involvement and approval.

Master's Thesis Advisor (MSBMI degree)

All MSBMI students will identify a primary thesis advisor during their first semester in the degree program. The thesis advisor serves in a similar role to a doctoral dissertation advisor, acting as the primary source of advising for the student's master's thesis.

MSBMI students will designate two additional thesis committee members (see below), whom together with the thesis advisor will form the full thesis committee. Students will identify a suitable thesis advisor under the guidance of their academic advisor during their first semester in the MSBMI program. It is the student's responsibility to contact their desired advisor and ask if they would be willing to serve in this capacity. Final approval will be given by MSBMI program leadership.

MSBMI students should meet regularly with their primary thesis advisor, likely increasing in frequency as the student nears their thesis defense.

We encourage all thesis mentors to include MSBMI advisees as regular members of their research groups. Where applicable, this could include attendance at lab meetings, collaboration on projects led by other members of the research group, allowing the student to use a desk in the advisor's lab space, and others.

Master's Thesis Committee Member (MSBMI degree)

All MSBMI students will identify - in addition to their primary Thesis Advisor - two additional thesis committee members in the following roles: (1) An application domain mentor, and (2) A research methods mentor. The application domain mentor may be an informatician, but more often a faculty member in one of the Penn health schools who has expertise in a particular clinical or biomedical problem. The methods mentor may be an informatician, but could also be faculty in statistics/biostatistics, computer science, implementation science, or other programs or departments. Together, the complete master's thesis committee consists of the primary thesis advisor, the application domain mentor, and the research methods mentor, and they serve a role analogous to that of a doctoral dissertation committee.

Students will be provided with a list of available thesis committee members and will select one from each of the two categories described above. Under the guidance of their academic advisor and/or primary thesis advisor, they will contact the desired committee members and ask if they are willing to serve in that role. Final approval of the full thesis committee will be given by program leadership.

MSBMI students should meet simultaneously with all members of their thesis committee as needed, but no less than once per semester. Ad-hoc (likely 1-on-1) meetings will often increase in frequency as the student nears their thesis defense.

Capstone Advisor (MCI degree)

Each project is supervised by an IBI Senior Fellow, selected by the student and vetted by the Advising Committee. The Capstone Advisor will be selected by the student for expertise in the topic addressed in the capstone. Additional individuals with expertise relating to the student's project can join the advisory team as needed. The Capstone Advisor will be responsible for ensuring a high degree of quality of the project and the student's work thereupon. The Capstone Advisor will be responsible for guiding and evaluating the student's progress throughout the semester, and for submitting the final evaluation and a grade. This grade is then used as part of the overall capstone grade.

Students are provided with a list of IBI Senior Fellows who have volunteered to serve as capstone advisors. With the guidance of their academic advisor, students should select a mentor aligned with the area of focus of their desired capstone project and ask the mentor if they would be willing to serve in this mentorship role. Capstone mentor assignments must be approved by the MCI Advising Committee based on suitability of the mentor to direct the intended capstone project.

MCI students should meet with their capstone mentor at least once before approval of the capstone project (to plan the details of the project), and frequently during the semester when the capstone project is being completed. The precise level of involvement is up to the mentor and the student, but as a general guideline should involve a minimum of one meeting per month while the capstone project is being carried out.

Academic Advisor (MSBMI and MCI degrees)

All MSBMI and MCI students are assigned an academic advisor at the start of the degree program. The academic advisor should be separate from the thesis primary advisor (MSBMI students) and capstone mentor (MCI students).

Academic advisors provide general guidance to trainees as they progress through the MSBMI and MCI degree programs, including but not limited to progress towards the degree, advice in registering for courses, selection of electives, and how to optimize the degree program in terms of future career goals. They also can provide general academic advice and help students connect with other individuals Penn and elsewhere to advance their careers.

Unlike capstone mentors and thesis advisors, academic advisors are expected to hold general expertise in biomedical informatics, but not necessarily domain expertise in the student's area of research/clinical interest.

Syllabi

A well-thought-out syllabus will convey expectations for your course and is required for all BMIN courses. Here are some basics to include:

- Course title and number
- Contact information for the instructor(s) and TA(s), including email, offices, and their location
- Course description that explains the course's scope, purpose, format, and any pre-requisites
- List of readings or other resources students may need
- List of what students should be able to do by the end of the course (learning outcomes)
- Schedule of lectures – consult Penn Academic Calendar for important dates (e.g. first day of classes, last day of classes, final exam period, University-observed holidays and breaks when no classes are held)
- A copy of the MCI/MSBMI Grading Scale
- Percentage breakdown of how different assignments will contribute to the final grade
- Description of major assignments
- Late assignments
- Attendance
- Class participation
- Academic integrity (link to University's Code of Academic Integrity)
- Use of electronic devices (laptops, cell phones)

Course directors are encouraged to distribute the syllabus prominently (e.g., on your course's Canvas page or similar) and to walk through it with your class at the beginning of the semester.

Canvas

Canvas is Penn's Learning Management System for courses. Canvas is known for its user-friendly online environment and ability to easily connect instructors and students both in and out of the classroom. Within Canvas, you can make announcements, share documents, submit assignments, assign grades, and more.

- Your course site will be requested for you before the start of the semester. Please inform the Program Coordinator if you would want to import course content from the last time the course was offered.
- Canvas Support for Faculty and Staff: Get Started is an online guide offered through Penn Libraries for setting up your site and navigating Canvas.
- Canvas Login Information
- For immediate assistance, submit an online help request to canvas@pobox.upenn.edu.

Course Enrollment Policy

Students in the master's and certificate programs are given priority to register for required and elective BMIN courses. Registration for all other students will be made on a first-come, first-served basis, by requesting a permit from the Program Coordinator. Accepting students into classes will be based on completion of pre-requisites of the course (if needed) or until class size limits are reached.

Course Drop / Withdrawal Policy

The drop deadline is the last date for students to drop a class without it appearing on their transcript for the term. Dropping after the course selection deadline but prior to the drop deadline will carry a 50% financial obligation for the student.

After the drop deadline, the only option is for a student to withdraw from a course, which will result a “W” posted as the grade for that course on the transcript. Students who withdraw are responsible for 100% of the cost of the course. After the withdrawal deadline, students may not withdraw from a course. All deadlines stated in the Academic Calendar must be observed.

All drops and withdrawals must be processed by the Master’s and Certificate (MaC) Programs office. Please forward any requests from the student to the Program Coordinator.

Teaching Assistants (TAs)

The assignment of teaching assistants requires approval by the Program Director. Teaching assistants are approved based on a number of factors, including but not limited to: Projected class enrollment, course design and management, expected interaction with students outside the scheduled class time (e.g., break-out sessions, office hours, discussion boards, e-mail) intensity of grading and evaluation of student performance.

Requests for teaching assistants are submitted once enrollment has reached the required minimum number of students. The following table provides guidance for the allocation of teaching assistants. The number of teaching assistants per course is determined by the Program Director, as appropriate and varies by course based on the faculty member's summary of intensity of grading and evaluation, course management, etc.

Guidelines for Allocation of Teaching Assistants

Enrollment	Teaching Assistant(s)
10 - 25	1
26 - 35	2

The above table is intended to serve as a general guide based on course size. However, recognizing that course size is only one factor that may affect needs, each request is evaluated on a case-by-case basis so that other factors such as course design, intensity of grading and evaluation, or course management can also be considered.

Teaching Assistants' Responsibilities

Both instructors and teaching assistants (TAs) should recognize that time pressures can vary greatly over the course of a semester. For instance, TA duties usually are light at the start of the course, heavy in the middle, and then light again toward the end (unless assistance is required grading exams).

Experience shows that grading homework and preparing and directing lab or discussion sessions are the two items that occupy most of a TA's time, especially for first-time TAs. TAs should not hesitate to request specific direction on what to present in lab or discussion sessions. Although the success of a course is ultimately the instructor's responsibility, students should recognize that instructors cannot be expected to solve problems that they don't know exist. Open communication is the key to a successful teaching experience. In cases where TA duties include assisting in the grading of exams, course instructors should provide the TA with clear guidance on how to assign points. Instructors should also recognize that some students may feel awkward evaluating their peers.

The course director may provide the opportunity for the TA to prepare and deliver at least one lecture. In this case, the course director should allow the TA sufficient time to prepare the lecture and should offer any necessary guidance about what is to be covered. Whenever possible, the TAs lecture will be recorded and reviewed with the course director and his/her dissertation advisor in order to identify strengths and weakness.

To ease communication, TAs should share their email addresses and / or other appropriate contact information with their students. TAs are not on call for their students; nevertheless, students should expect reasonable access to TAs, particularly in the days leading up to exams and project due dates.

TA duties typically include some or all of the following:

- Attending lectures
- Holding office hours

- Running lab sessions
- Assisting in the preparation of handouts, exams and solution sets
- Grading homework and recording grades
- Helping to grade exams and recording the grades
- Coordinating access to computing facilities, online data sets, and web applications
- Attending regular meetings with the course instructor(s)

Resources for Teaching Assistants

See below for a description of teaching resources offered by Penn's Center for Excellence in Teaching, Learning and Innovation (CETLI).

Grades and Academic Standards

The grading system, incomplete grades, and academic standing requirements are set out in Part I under "Grading" and "Academic Standing & Probation." The guidance below applies to course directors when assigning grades.

Standardized Grading Scale

Course directors have some leverage in determining precisely how letter grades are assigned. However, program leadership strongly encourages the use of the following standardized grading scale:

LETTER	NUMBER EQUIVALENT	NOTES
A+	97-100	
A	94-96	
A-	90-93	
B+	87-89	
B	84-86	
B-	80-83	Minimum for good academic standing.
C+	77-79	Core courses with C+ or lower must be retaken and the student will be placed in academic probation.
C	74-76	
C-	70-73	
D+	67-69	
D	64-66	
D-	60-63	
F	Below 60	Failing; no credit earned.

With the help of the Program Coordinator, grades are entered in Path@Penn by the posted deadline in each semester.

Course Evaluations

All BMIN courses are evaluated in Blue. At the beginning of each semester, the Program Coordinator will solicit faculty members for a copy of their syllabus and for any special questions to be added to the standard evaluation form. Course evaluation reports are typically available approximately four to eight weeks after the end of the semester. The Program Coordinator will provide each faculty member with their report as soon as it is available and has been reviewed by the Program Director.

New Courses

The MCI and MSBMI Advising and Curriculum Committee advises the program leadership and collectively makes decisions on all matters related to course development, curricular requirements, course implementation, course content, grade petitions and course credit (including parameters for appropriate electives and independent study courses). All new courses or substantial changes to existing courses must be formally approved by the Advising and Curriculum and Executive Committee.

New course proposals and innovations are welcomed by MCI and MSBMI leadership and can be presented to the Advising and Curriculum Committee for approval by the Executive Committee. Presentations must include: A needs assessment, particularly regarding the target audience and how the class fits within the existing MCI portfolio; Draft syllabus or course outline; Course objectives; Budgetary requirements, if any; and an estimation of IBI staff time (if applicable).

Student Intervention Services

Student Intervention Services (SIS) assists the University community in handling emergencies or critical incidents involving the welfare and safety of students. In partnership with the Offices of Counseling and Psychology Services (CAPS), the Chaplain's office and the Division of Public Safety, SIS is able to manage cases involving critical incidents.

SIS asks faculty to contact their general line (215-898-4357) in the event they witness a student in distress or become aware of situations that may adversely affect the lives of their students.

The SIS website can be found here: https://home.vpul.upenn.edu/intervention/. Various resources on the SIS website include emergency numbers, contacts, and manuals.

Guidelines for Addressing Academic Issues of Students with Disabilities

The University of Pennsylvania is committed to providing access and equal educational opportunities to all students, including students with disabilities. Penn does not discriminate against students with disabilities. The University provides reasonable accommodation to a student's known disability in order to afford that student an equal opportunity to participate in all University-sponsored academic and extra-curricular programs, activities, and services.

https://catalog.upenn.edu/pennbook/students-with-disabilities/

Students with disabilities and temporary conditions are served by the Office of Student Disabilities Services (SDS). SDS is responsible for assessing all student requests for accommodation and determining reasonable accommodations for students with disabilities. The Office of Student Disabilities Services is available to assist faculty and professional staff with the provision of academic accommodation and for consultation regarding students with disabilities.

Phone: 215-573-9235

disabilityservices@vpul.upenn.edu

Resources for Teaching at Penn

Center for Excellence in Teaching, Learning and Innovation (CETLI)

Penn's Center for Excellence in Teaching, Learning and Innovation (CETLI) offers programs to help all instructors excel in their teaching. CETLI events bring instructors together to gain insight from colleagues through open discussions of teaching topics. Many of these are faculty-guided conversations; others are structured teaching workshops led by CETLI staff. Additionally, CETLI staff are available to consult individually with instructors across Penn about any aspect of teaching. Instructors at all levels of experience and expertise – from senior faculty to new teaching assistants, from acclaimed and ambitious teachers to those facing particular challenges – participate in CETLI programs.

Programs and Services for Faculty include:

- CETLI Teaching Seminars
- Teaching Consultations & Classroom Observation
- Course Design Institute
- Teaching Discussions & Workshops For New Faculty
- Teaching that Enables Every Student to Thrive
- Curricular Planning
- Workshops by Request

Teaching Resources, Practices and Strategies available from CETLI:

- Supporting Your Students Teaching with Technology
- Syllabus Language and Policies
- Course Roster, Classroom & Calendar Info
- Penn Policies and Regulations
- Course Evaluations
- Academic Integrity
- Teaching Online
- Structures Active In-Class Learning (SAIL)
- For New Faculty
- Grants for Teaching

If you have questions about teaching at Penn, you are welcome to consult with the staff at the CETLI at any time. CETLI also organizes a variety of faculty programs, providing faculty with structured opportunities to discuss their teaching with colleagues.

Contact:

Van Pelt-Dietrich Library

First floor

3420 Walnut Street

Philadelphia, PA 19104-6206

Phone: (215)746-3613

CETLI-info@upenn.edu

Appendix A. Checklist for Academic Advisors

All MSBMI and MCI students are assigned an academic advisor at the start of the degree program. The academic advisor is separate from the MSBMI thesis primary advisor and the MCI capstone mentor. Academic advisors provide general guidance to trainees as they progress through the degree program, including but not limited to progress toward the degree, advice on registering for courses, selection of electives, and how to optimize the program in terms of future career goals. They also provide general academic advice and help students connect with individuals at Penn and elsewhere to advance their careers. Academic advisors are expected to hold general expertise in biomedical informatics, but not necessarily domain expertise in the student's area of research or clinical interest. Academic advisors are assigned to each student by program leadership at the time of new student orientation (generally in late August of the student's first academic year); program leadership will check with advisors before making the final assignment. It is important that you meet with your advisee at the beginning of each semester and additionally as needed. Your door should be open in between times.

New Students

First Meeting – During New Student Orientation (Fall, Year 1)

- Introductions
    - Describe yourself and your work in biomedical informatics in more detail. Concentrate on one or two projects.
    - Ask the student to describe their interests, degree program (MSBMI or MCI), intended concentration or clinical area, and career goals following the degree.
- Review the student's course plan for the first semester and the year ahead. In the case of any issues registering for courses via Path@Penn, direct the student to contact Meg Tanjutco (Margareth.tanjutco@pennmedicine.upenn.edu) for assistance. Discuss the balance of core, concentration- or track-specific, and elective courses, and how the plan supports the student's career goals. If you don't know the answer to a question about a course, note that you (and the student) will follow up with the course director.
- Reinforce the importance of becoming familiar with the Biomedical Informatics Masters and Certificate Programs Student Handbook, especially the "PSOM and University Policies" section (academic integrity, registration, grading, and academic standing).
- Confirm that the student completes required onboarding, including the online HIPAA and CITI training modules required of all PSOM students.
- Clarify how your role differs from the student's other mentors. For MSBMI students, encourage them to begin identifying a thesis area and a primary thesis advisor during the first semester; the thesis primary advisor and committee are distinct from you as academic advisor. For MCI students, note that the mentored capstone (BMIN 9900) comes in the final year, with the capstone proposal and mentor selected the semester prior, and that the capstone mentor is likewise distinct from you as academic advisor.
- Set the expectation that you will meet with the student at the beginning of each semester and are available as needed; stress that your door is open in between times.

Continuing Students

Start-of-Semester Meeting (Each subsequent semester)

- Review the student's progress toward the degree, identifying any issues or problems and creating a mitigation plan as needed. There is no formal rubric for this plan, but it should be clearly articulated with

tasks and deadlines as appropriate. If needed, consult the Program Director or the Advising & Curriculum Committee.
- Review the student's course plan and provide guidance on course and elective selection for the semester ahead, as appropriate to the student's program and progress toward the degree.
- Revisit the student's career goals and help connect the student with individuals at Penn and elsewhere who can help advance them.
- Confirm that the student remains on track for the program's time-to-degree limits — completion within four years and not exceeding 150% of the academic plan set at matriculation.

Program-Specific Milestones to Keep in View

These milestones are guided primarily by the thesis primary advisor (MSBMI) or capstone mentor (MCI) rather than by you as academic advisor, but keeping them in view will help your start-of-semester meetings flag any student who is falling behind.

MSBMI – Thesis

- The student identifies a primary thesis advisor during the first semester (the student initiates contact; final approval rests with MSBMI program leadership).
- The thesis committee comprises the primary advisor plus two additional members — an application-domain mentor and a research-methods mentor — and meets at least once per semester.
- The thesis progresses from a formal research proposal through the study and a publishable manuscript to a public defense; two thesis credits are awarded upon a successful defense.

MCI – Capstone

- The student completes a minimum of 7 course units of required coursework before beginning the capstone.
- The capstone proposal and capstone mentor are selected the semester prior to the capstone term; the mentor is an IBI Senior Fellow approved by the MCI Advising Committee.
- The mentored capstone (BMIN 9900) is completed in the final year within a single 15-week semester.

Appendix B. Approved Elective Courses

Possible electives for the MCI and MSBMI degrees include, but are not limited to:

- Implementation Science (HPR 6200)
- Systems Thinking in Patient Safety (HPR 6500)
- Longitudinal and Clustered Data (EPID 6210)
- Decision Models and Uncertainty (OIDD 6210)
- Data visualization and interaction design (CIS 5600)
- Data ethics, IP, and privacy (LAW 5060)
- Data mining (ESE 5450)
- Medical Devices (HCMG 8530)
- Comparative Health Care Systems (HCMG 8590)
- Introduction to Bioinformatics (GCB 5350)
- Decision Support Systems (OPIM 6720)
- E-Health: Business Models and Impact (HCMG 8660)
- Process Improvement Tools and Strategies (DYNM 6340)
- Qualitative Methods Research (HPR 5030)
- Clinical Economics and Decision Making (HPR 5500)
- Principles and Practice of Quality Improvement and Patient Safety (HPR 5040)
- Impact Evaluation (PUBH 540)
- Health Communication in the Digital Age (PUBH 5650)
- Organizational Project Management (DYNM 6190)
- Introduction to Machine Learning (CIS 5190)
- Big Data Analytics (CIS 5450)

These courses have been approved by the Curriculum Committee on the basis of relevance to the MCI and MSBMI degree programs. If you desire to take a course that is not on this list, please contact Meg Tanjutco and she will coordinate review by the Curriculum Committee for approval.