

# Translational Biomedicine, M.S.

The goals of the M.S. program in translational biomedicine are to:

- promote interaction and collaboration among researchers across the spectrum of biomedicine;
- enrich translational vocabulary and an understanding of T1 research (laboratory), T2 research (application to evidence-based practice), T3 research (implementation and dissemination), and T4 research (population studies and policy development) among basic, clinical, and human studies scientists; and
- develop skills in ethical decision making, scientific leadership, team building, networking, and research program management.

## Requirements

The Master of Science program in translational biomedicine (TBM) requires a minimum of 30 s.h. of graduate credit plus a final project. Students must maintain a cumulative graduate g.p.a. of at least 3.00 in all UI course work. The plan of study for students in the two-year program is based on their chosen discipline.

The program is designed to teach members of scientific teams how to move biomedical discoveries into clinical applications and beyond. It is tailored for individuals who have completed doctoral-level training in one area of biomedicine and wish to apply their expertise to the T1-T4 research spectrum. The program admits individuals who hold medical or graduate degrees (e.g., M.D., D.O., D.D.S., D.N.P., Ph.D., Pharm.D., D.V.M., or the equivalent) and are employed by the University of Iowa at the faculty ranks of associate professor, assistant professor, instructor, a fellow physician, or a postdoctoral scholar/fellow.

The M.S. with a major in translational biomedicine requires the following course work.

## Core Courses

Code	Title	Hours
All of these:		
TBM:5000	Translational Biomedical Research	9
TBM:5001	Introduction to Translational Biomedicine	3
TBM:5002	Critical Thinking and Communication: Study Design and Commercialization	1
TBM:5003	Critical Thinking and Communication: Scientific Writing and Presentation Strategies	1
TBM:5004	Critical Thinking and Communication: Career Development and the Funding Process	1

TBM:5005	Critical Thinking and Communication: Leadership, Team Science, and Mentoring	1
BIOS:4120	Introduction to Biostatistics	3
EPID:4400	Epidemiology I: Principles	3
EPID:6950	Clinical Research Ethics	2
Total Hours		24

## Electives

Students must earn a minimum of 6 s.h. in graduate-level elective course work pertinent to their educational goals and background. Electives may be selected from the lists below, or students may obtain approval for other courses with program administration approval.

## Epidemiology

Code	Title	Hours
EPID:5241	Statistical Methods in Epidemiology	4
EPID:5500	Introduction to Clinical Epidemiology	3
EPID:5610	Intermediate Epidemiology Data Analysis with SAS and R	3
EPID:5900	Problems and Special Topics in Epidemiology	arr.
EPID:6100	Writing a Grant Proposal	3
EPID:6150	Writing for Medical Journals	1
EPID:6250	Genetics and Epidemiology	3
EPID:6400	Epidemiology II: Advanced Methods	4
EPID:6650	Cardiovascular Disease Epidemiology	3
EPID:6900	Design of Intervention and Clinical Trials	3

## Drug Discovery

Code	Title	Hours
BME:5330	Computational Genomics	3
PCOL:5136	Pharmacogenetics and Pharmacogenomics	1
PCOL:6250	Advanced Problem Solving in Pharmacological Sciences	1
PHAR:5512	Drug Discovery and Mechanisms	3

## Innovation

Code	Title	Hours
ENTR:9400	Evaluating Innovation Opportunities	2-3
ENTR:9550	Commercializing New Technology	3
LAW:9717	Iowa Medical Innovation Group Seminar	arr.
NURS:6553	Seminar on Innovations	4

## Device Development

Code	Title	Hours
BME:5210	Medical Imaging Physics	3
BME:5220	Digital Image Processing	3
BME:5230	Multidimensional Medical Imaging Process	3
BME:5401	Biomaterials and Implant Design	3
BME:5510	Cardiovascular Biomechanics	3
BME:5520	Cardiovascular Fluid Mechanics	3
BME:5530	Design of Circulatory Implants and Artificial Organs	3
BME:5550	Cardiovascular Tissue Mechanics	3
BME:5610	Musculoskeletal Biomechanics	3

## Neuroscience

Code	Title	Hours
NSCI:5210	Fundamentals of Behavioral Neuroscience	3-4
NSCI:5365	Seminar: Neuropsychology and Neuroscience	arr.
NSCI:5653	Fundamental Neurobiology	3
NSCI:5753	Developmental Neuroscience	1
NSCI:6250	Functional Magnetic Resonance Imaging	2-3
NSCI:7235	Neurobiology of Disease	3
PSY:6280	Structural and Functional MRI Methods and Application	3
PSY:6370	Principles of Neuropsychology	3

## Genetics

Code	Title	Hours
ACB:6200	Special Topics in Genetics	1
BME:5330	Computational Genomics	3
GENE:5173	Computational Genomics	3
GENE:6150	Genetic Analysis of Biological Systems	3
GENE:6234	Basic Biostatistical Methods with Genetics Applications	1
GENE:7191	Human Molecular Genetics	3

## Informatics and Biostatistics

Code	Title	Hours
BIOS:5120	Regression Modeling and ANOVA in the Health Sciences	3
BIOS:5510	Biostatistical Computing	2
BIOS:5710	Biostatistical Methods I	4
BIOS:5720	Biostatistical Methods II	4
BIOS:5730	Biostatistical Methods in Categorical Data	3
BIOS:6110	Applied Categorical Data Analysis	3

BIOS:6210	Applied Survival Analysis	3
BIOS:6310	Introductory Longitudinal Data Analysis	3
BIOS:6420	Survey Design and Analysis	3
BIOS:6610	Statistical Methods in Clinical Trials	3
BIOS:6650	Causal Inference	3
BIOS:6720	Statistical Machine Learning for Biomedical and Public Health Data	3
BIOS:6810	Bayesian Methods and Design	3
BIOS:7230	Advanced Clinical Trials	3
BIOS:7600	Advanced Biostatistics Seminar	0-3
BME:5320	Bioinformatics Techniques	3
EPID:5200	Principles of Public Health Informatics	3

## Miscellaneous

Code	Title	Hours
PATH:5260	Translational Histopathology	3

## Final Project

In addition to completion of the 30 s.h. in required course work, scholars must submit a final project. The project may be in one of the following formats.

- A complete grant application for a K01, K08, K23, K08, R01, R03, R21, or a U.S. Department of Veterans Affairs career award. The R03 completed as part of the required grant writing course may not be submitted as the final project.
- An original research manuscript (less than 2,500 words) of a published or in publishable quality for a peer-reviewed journal. The manuscript must contain the following components:

a structured abstract;

an introductory section that adequately frames the research question addressed; and

a methodology section that sufficiently describes the following elements (study design, study sample, data collection strategies and sources, data elements, and data analysis), results of the study, and a discussion including a description of the relationship of the current findings to prior relevant research and/or policy implications of the findings and methodological limitations.

## Admission

The Translational Biomedicine Program welcomes applicants who have diverse educational and scientific backgrounds and varied research interests. Applicants must have a strong interest and background in a health science profession and knowledge of basic sciences and medicine.

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations of the Graduate College.

Translational biomedicine applicants must:

- have a doctoral-level degree in a biomedical discipline (e.g., M.D., D.O., D.D.S., D.N.P., Ph.D., Pharm.D., D.V.M., or the equivalent);
- be employed by the University of Iowa as an associate professor, assistant professor, instructor, a fellow physician, or a postdoctoral scholar/fellow;
- be engaged in scientific research with a University of Iowa mentor who has funding from a peer-reviewed source (e.g. National Institutes of Health, National Science Foundation, another foundation, and so forth);
- hold a bachelor's degree from a regionally accredited American college or university or an equivalent degree from an international institution, as determined by the University of Iowa Office of Admissions;
- have a g.p.a. of at least 3.00 or the international equivalent, as determined by the University of Iowa Office of Admissions; and
- have a Graduate Record Exam (GRE) General Test combined verbal and quantitative score of 300 on the revised test (or 1050 on the old test) and an analytical writing score of 4.0 or above; applicants who already hold a graduate or professional degree may seek a waiver of the GRE requirement.

Applicants whose first language is not English must score at least 100 (internet-based) on the Test of English as a Foreign Language (TOEFL), or they must have a score of at least 7.0, with no subscore lower than 6.0, on the International English Language Testing System (IELTS).

Applicants must submit a curriculum vitae, a statement of research interest and career goals, and three letters of recommendation. One letter must be from the applicant's UI research mentor; the program recommends that the second be a letter of support from the applicant's department chair.

All prospective students, and their mentors, must guarantee that once they are accepted as students in the program, they will be able to devote essentially all of their time over a two-year period to training. For instance, a fellow in the Carver College of Medicine might spend no more than two months each year working on clinical assignments (e.g., two months of inpatient assignments or one month of inpatient assignments and one-half day per week in a clinic).

## Academic Plans

### Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

### Translational Biomedicine, M.S.

Course	Title	Hours
<b>Academic Career</b>		
<b>Any Semester</b>		
Final Project <sup>a</sup>		
	Hours	0
<b>First Year</b>		
<b>Fall</b>		
TBM:5000	Translational Biomedical Research	3
TBM:5001	Introduction to Translational Biomedicine	3

TBM:5002	Critical Thinking and Communication: Study Design and Commercialization	1
	Hours	7
<b>Spring</b>		
TBM:5000	Translational Biomedical Research	3
TBM:5003	Critical Thinking and Communication: Scientific Writing and Presentation Strategies	1
BIOS:4120	Introduction to Biostatistics	3
EPID:6950	Clinical Research Ethics	2
	Hours	9
<b>Second Year</b>		
<b>Fall</b>		
TBM:5004	Critical Thinking and Communication: Career Development and the Funding Process	1
EPID:4400	Epidemiology I: Principles	3
Elective course		3
	Hours	7
<b>Spring</b>		
TBM:5000	Translational Biomedical Research	3
TBM:5005	Critical Thinking and Communication: Leadership, Team Science, and Mentoring	1
Elective course		3
	Hours	7
	Total Hours	30

- a Complete one of the following formats: a complete grant application (K23, K08, K01, R01, R03, R21, or VA career award) or an original research manuscript (>2500 words) of published or in-publishable quality for a peer-reviewed journal. Additional requirements apply.