

# Translational Biomedicine, MS

## Learning Outcomes

The goals of the MS program in translational biomedicine are to:

- promote interaction and collaboration among researchers across the translational research spectrum;
- enrich 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) for basic and clinical scientists to expand the relevance of their work in these areas; 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 34 s.h. of graduate credit plus a final project. Students must maintain a UI cumulative graduate program grade-point average of at least 3.00. The plan of study for students in the two-year program is tailored to their scientific goals and interests.

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 translational research spectrum. The program admits individuals who hold medical or graduate degrees (e.g., MD, DO, DDS, DNP, PhD, PharmD, DVM, or the equivalent) and are employed by the University of Iowa at the faculty ranks of associate professor, assistant professor, instructor/associate, fellow physician, or postdoctoral scholar/fellow.

The MS in translational biomedicine requires the following coursework.

## Core Courses

Course #	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 Community Engagement	1
BIOS:4120	Introduction to Biostatistics	3
EPID:4400	Epidemiology I: Principles	3
EPID:6950	Clinical Research Ethics	2
One of these:		
BIOS:5120	Regression Modeling and ANOVA in the Health Sciences	3
EPID:5241	Statistical Methods in Epidemiology	4

## Electives

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

### Biostatistics

Course #	Title	Hours
BIOS:5130	Applied Categorical Data Analysis	3
BIOS:5310	Research Data Management	3
BIOS:6210	Applied Survival Analysis	3
BIOS:6310	Introductory Longitudinal Data Analysis	3
BIOS:7600	Advanced Biostatistics Seminar	0-3

### Device Development

Course #	Title	Hours
BME:5101	Biomaterials and Implant Design	3
BME:5640	Ergonomics of Occupational Injuries	3

### Drug Discovery

Course #	Title	Hours
PCOL:5135	Principles of Pharmacology	1
PCOL:5136	Pharmacogenetics and Pharmacogenomics	1
PCOL:6203	Pharmacology for Graduate Students	5
PCOL:6250	Advanced Problem Solving in Pharmacological Sciences	1
PHAR:5512	Drug Discovery and Mechanisms	3

### Epidemiology

Course #	Title	Hours
EPID:5214	Meta-Analysis of Epidemiologic Studies	3
EPID:5241	Statistical Methods in Epidemiology	4
EPID:5500	Introduction to Clinical Epidemiology	3
EPID:5560	Biomarkers in Epidemiology	3

EPID:5610	Intermediate Epidemiology Data Analysis With SAS and R	3
EPID:6400	Epidemiology II: Advanced Methods	4
EPID:6900	Design of Intervention and Clinical Trials	3

## Genetics

Course #	Title	Hours
ACB:6200	Current Topics in Genetics	1
BIOL:3373	Human Population Genetics and Variation	3
BIOL:3713	Molecular Genetics	4
BIOL:5412	Fundamental Genetics - Graduate Lecture	3
GENE:6150	Genetic Analysis of Biological Systems	3
GENE:7191	Human Molecular Genetics	3
MMED:6250	Mechanisms of Parasitism Journal Club	1
PCOL:5136	Pharmacogenetics and Pharmacogenomics	1

## Informatics

Course #	Title	Hours
BIOL:4213	Bioinformatics	2,4
BIOL:4386	Introduction to Scientific Computing for Biologists	3
CS:5110	Introduction to Informatics	3
IGPI:3314	Genomics	3

## Innovation

Course #	Title	Hours
ENTR:2000	Entrepreneurship and Innovation	3
MED:8073	Biomedical Innovation	1
NURS:6553	Seminar on Innovations	4

## Neuroscience

Course #	Title	Hours
BIOL:2753	Introduction to Neurobiology	3
NSCI:5212	Foundations in Behavioral and Cognitive Neuroscience	4
NSCI:5653	Fundamental Neurobiology I	3
PSY:6370	Principles of Neuropsychology	3

## Final Project

In addition to completion of the 34 s.h. in required coursework, 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, R01, R03, R21, a U.S. Department of Veterans Affairs career development award, or the equivalent. The R03 completed as part of the required grant writing course may not be submitted as the final project.
- An original research manuscript that is of acceptable quality for a peer-reviewed biomedical journal (the paper can be ready for submission, under review, or already published). 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 on the Graduate College website.

Translational biomedicine applicants must:

- have a doctoral-level degree in a biomedical discipline (e.g., MD, DO, DDS, DNP, PhD, PharmD, DVM, or the equivalent);
- be employed by the University of Iowa as an associate professor, assistant professor, instructor/associate, 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, 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 University of Iowa Admissions; and
- have a grade-point average of at least 3.00 or the international equivalent, as determined by University of Iowa Admissions.

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.

Students and their mentors must guarantee sufficient time for coursework and research. The program does not require a specific percent effort, but successful candidates would likely devote 50–75% of their time to a combination of coursework and research.

## 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.

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Course	Title	Hours
<b>Academic Career</b>		
<b>Any Semester</b>		
34 s.h. of graduate level coursework must be completed; graduate transfer credits allowed upon approval. More information is included in the General Catalog and on department website. <sup>a</sup>		
In addition to completion of the required coursework, students must submit a final project. <sup>b</sup>		
<b>Hours</b>		<b>0</b>
<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
EPID:4400	Epidemiology I: Principles	3
<b>Hours</b>		<b>10</b>
<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
<b>Hours</b>		<b>9</b>
<b>Second Year</b>		
<b>Fall</b>		
TBM:5004	Critical Thinking and Communication: Career Development and the Funding Process	1
BIOS:5120 or EPID:5241	Regression Modeling and ANOVA in the Health Sciences or Statistical Methods in Epidemiology	3 - 4
Elective course <sup>c</sup>		3 - 4
<b>Hours</b>		<b>7-9</b>
<b>Spring</b>		
TBM:5000	Translational Biomedical Research	3
TBM:5005	Critical Thinking and Communication: Leadership, Team Science, and Community Engagement	1
Elective course <sup>c</sup>		3
<b>Hours</b>		<b>7</b>
<b>Total Hours</b>		<b>33-35</b>

<sup>c</sup> Elective coursework pertinent to educational goals and background may be selected from specific lists in Biostatistics, Device Development, Drug Discovery, Epidemiology, Genetics, Informatics, Innovation, and Neuroscience. Program administration approval required for other courses.

<sup>a</sup> Students must complete specific requirements in the University of Iowa Graduate College after program admission. Refer to the Graduate College website and the Manual of Rules and Regulations for more information.

<sup>b</sup> Complete one of the following formats: a complete grant application (K01, K08, K23, 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.