

# Clinical Investigation, MS

## Program Competencies

Graduates will be able to:

- discuss issues related to biomedical informatics impacting clinical research;
- summarize requirements for building and maintaining a multidisciplinary research team;
- describe health and disease measurement in clinical and community populations;
- describe how to implement a clinical research study;
- develop a clinical research question;
- apply principles of responsible research and clinical research ethics to a research project;
- determine a study aim, objectives, and appropriate design to address a hypothesis;
- analyze epidemiologic data with descriptive analysis and regression models, including linear and logistic regression;
- analyze literature to identify gaps in knowledge; and
- communicate clinical research findings effectively.

## Requirements

The Master of Science in clinical investigation requires 37 s.h. of graduate credit. In addition to completing the program's required coursework, students must write a manuscript or a grant proposal for a National Institutes of Health (NIH) career award or its equivalent, with oral defense. Graduate students must maintain a Graduate College program grade-point average of at least 3.00.

Students who receive a grade of C or lower in 7 s.h. of coursework may be dismissed from the program. They must seek the permission of the program to apply coursework with grades of C and C-minus toward the core courses or electives requirements.

The program, which is offered in collaboration with the university's Institute for Clinical and Translational Science, is designed for clinicians interested in pursuing careers in clinical research. It includes in-depth training in biostatistics, epidemiology, research ethics, and academic survival skills as well as didactic training applicable to clinical research careers. Graduates of the program are able to critically evaluate clinical literature, write competitive grant proposals, design and conduct clinical research projects, work effectively with other researchers and support staff, and disseminate research results through manuscripts and presentations.

The MS in clinical investigation requires the following coursework.

## Core Courses

All core courses except CPH:6100 and CPH:7270 must be completed with a grade of a C-plus or higher. Students must retake CPH:7270 if they completed the course more than four years ago or if they have changed degree programs.

| Course #                | Title                         | Hours |
|-------------------------|-------------------------------|-------|
| All of these (25 s.h.): |                               |       |
| BIOS:4120               | Introduction to Biostatistics | 3     |

|           |  |   |
|-----------|--|---|
| BIOS:5120 | Regression Modeling and ANOVA in the Health Sciences   | 3 |
| EPID:4400 | Epidemiology I: Principles   | 3 |
| EPID:5500 | Introduction to Clinical Epidemiology  | 3 |
| EPID:5610 | Intermediate Epidemiology Data Analysis With SAS and R   | 3 |
| EPID:6150 | Writing for Medical Journals   | 1 |
| EPID:6400 | Epidemiology II: Advanced Methods  | 4 |
| EPID:6950 | Clinical Research Ethics   | 2 |
| CPH:6100  | Essentials of Public Health  | 2 |
| CPH:7270  | Principles of Scholarly Integrity: Public Health (taken first year in the fall and spring semesters for 0 s.h. and 1 s.h., respectively) | 1 |

## Capstone Requirement

While a student does not take a final examination of courses, the evaluation of the student for graduation is based upon a positive review of a mentored K or R grant or a mentored publishable research paper. The grant or paper is completed in the second year of the program and is based on the area of focus. The capstone is a mentored activity that requires approval by a clinical mentor and a Department of Epidemiology primary faculty member. Successful completion of the course is denoted with a satisfactory (S) grade. The complete grant or paper will be due no later than one month prior to graduation for review.

| Course #  | Title                             | Hours |
|-----------|-----------------------------------|-------|
| EPID:6000 | Independent Study in Epidemiology | 2     |

## Electives

Students must earn a minimum of 10 s.h. in elective coursework from any of the following content areas with a grade of a C-plus or higher.

| Course #                                 | Title   | Hours |
|--|---|-------|
| <b>Research Design and Communication</b> |   |       |
| EPID:5214                                | Meta-Analysis of Epidemiologic Studies                      | 3     |
| EPID:6100                                | Writing a Grant Proposal                                    | 3     |
| EPID:6900                                | Design of Intervention and Clinical Trials                  | 3     |
| EPID:6910                                | Pharmacoepidemiology and Comparative Effectiveness Research | 3     |
| <b>Community Studies</b>                 |   |       |
| CBH:5235                                 | Community-Based Participatory Research                      | 3     |
| CBH:5305                                 | Evaluation: Approaches and Applications                     | 3     |
| CBH:6205                                 | Designing and Implementing Interventions                    | 3     |
| EPLS:5165                                | Introduction to Program and Project Evaluation              | 3     |
| <b>Epidemiology</b>                      |   |       |
| EPID:5560                                | Biomarkers in Epidemiology                                  | 3     |

|  |   |     |
|--|---|-----|
| EPID:5570                                    | Zoonotic Diseases   | 3   |
| EPID:6510                                    | Injury Epidemiology                                       | 3   |
| EPID:6550                                    | Epidemiology of Infectious Diseases                       | 3   |
| EPID:6560                                    | Hospital Epidemiology                                     | 2   |
| EPID:6600                                    | Epidemiology of Chronic Diseases                          | 3   |
| DPH:6004                                     | Principles of Oral Epidemiology                           | 3   |
| SEES:3110                                    | Geography of Health                                       | 3   |
| <b>Health Services Epidemiology</b>          |   |     |
| EPID:6360                                    | Nutrition Intervention in Clinical Trials Research        | 2   |
| EPID:6655                                    | Causal Inference  | 3   |
| EPID:6920                                    | Applied Administrative Data Analysis                      | 2   |
| BIOS:6610                                    | Statistical Methods in Clinical Trials                    | 3   |
| BIOS:7600                                    | Advanced Biostatistics Seminar                            | 3   |
| PCOL:5136                                    | Pharmacogenetics and Pharmacogenomics                     | 1   |
| <b>Informatics</b>                           |   |     |
| EPID:5600                                    | Introduction to Epidemiology Data Management and Analysis | 3   |
| HMP:5315                                     | Health Information Systems                                | 3   |
| <b>Nutrition Science</b>                     |   |     |
| EPID:6330                                    | Global Nutrition Policy                                   | 2-3 |
| EPID:6350                                    | Nutritional Epidemiology                                  | 2   |
| EPID:6370                                    | Nutrition Intervention in Research Lab                    | 3   |
| <b>Outcomes and Health Services Research</b> |   |     |
| HMP:5410                                     | Health Economics I  | 3   |
| HMP:7550                                     | Cost Effectiveness and Decision Analysis                  | 3   |
| HMP:7960                                     | Analytic Issues in Health Services Research I             | 3   |
| HMP:7965                                     | Analytic Issues in Health Services Research II            | 3   |
| <b>Pharmacy Science</b>                      |   |     |
| PHAR:5310                                    | Health Services Research Seminar                          | 1   |
| PHAR:5350                                    | Introduction to Research Methods                          | 3   |
| PHAR:6305                                    | Foundation Literature in Health Services Research         | 3   |
| <b>Statistical Methods</b>                   |   |     |
| BIOS:6210                                    | Applied Survival Analysis                                 | 3   |
| BIOS:6310                                    | Introductory Longitudinal Data Analysis                   | 3   |
| <b>Translational Biomedicine</b>             |   |     |
| TBM:5001                                     | Introduction to Translational Biomedicine                 | 3   |

## Graduate Education

Graduate education prepares students with advanced knowledge and skills in specialized fields. At the University of Iowa, the Graduate College advocates for student-centered

graduate education and supports equitable application of rules and policies across graduate programs.

## Academics

University of Iowa graduate credentials are regulated by policies and requirements found in the Graduate College Manual of Rules and Regulations. This includes minimum grade-point average (GPA) requirements for academic standing and degree conferral. The Graduate College sets the minimum requirement. Individual graduate programs may establish higher GPA requirements.

## Admissions

Graduate student applicants must meet admission requirements for both the Graduate College and the program to which they have applied. University of Iowa graduate admission requirements are published by the Graduate College and on the Graduate Admissions website.

## Financial Support

Graduate students might be eligible for financial support. Several contingencies apply, including degree program and award type, satisfactory progress toward degree, satisfactory completion of all duties related to an appointment, and availability of funding. Graduate students should inquire directly with their program for more information about funding availability. The Graduate Student Employment Standards govern the employment relationship between the University of Iowa and all graduate teaching and research assistants in all matters except wages, which are covered by an existing collective bargaining agreement or the conditions of an applicable federal grant.

## Admission

Applicants must apply through the Schools of Public Health Application Service (SOPHAS); they must also pay the required application fee to the Graduate College through University of Iowa Admissions when prompted. For detailed application information, visit How to Apply to the Department of Epidemiology on the department's website.

Applicants must hold a doctoral-level degree in a clinical discipline (e.g., MD, DO, DDS, PhD, PharmD, DVM) or be enrolled in the Medical Scientist Training Program (Carver College of Medicine). They must hold a baccalaureate degree with a cumulative grade-point average of at least 3.00; internationally trained applicants must have an outstanding doctoral training record evidenced by research publications.

Applicants are considered based on their credentials, prior training, and research training plans. Applicants with deficiencies in one area may be admitted if all other components of their application are strong. Individuals must have a sponsoring department.

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

Application deadlines for fall admission are June 1 for U.S. citizens and April 15 for international applicants. For summer admission, the deadline is April 1; for spring admission, Dec. 1.

## Prerequisites

The MS program requires at least 6 s.h. of prerequisite coursework in the disciplines of pathology, physiology, and/

or pharmacology. Students accepted into the degree program who have not completed at least 6 s.h. from those disciplines may meet the requirement while they are enrolled.

## 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.

### Clinical Investigation, MS

| Course  | Title   | Hours     |
|---|---|-----------|
| <b>Academic Career</b>  |   |           |
| <b>Any Semester</b>   |   |           |
| 37 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, b</sup> |   |           |
| Graduate College program GPA of at least 3.00 is required.  |   |           |
| <b>Hours</b>  |   | <b>0</b>  |
| <b>First Year</b>   |   |           |
| <b>Fall</b>   |   |           |
| BIOS:4120   | Introduction to Biostatistics                                 | 3         |
| CPH:6100  | Essentials of Public Health                                   | 2         |
| CPH:7270  | Principles of Scholarly Integrity: Public Health <sup>c</sup> | 0         |
| EPID:4400   | Epidemiology I: Principles                                    | 3         |
| EPID:5500   | Introduction to Clinical Epidemiology                         | 3         |
| <b>Hours</b>  |   | <b>11</b> |
| <b>Spring</b>   |   |           |
| BIOS:5120   | Regression Modeling and ANOVA in the Health Sciences          | 3         |
| CPH:7270  | Principles of Scholarly Integrity: Public Health <sup>c</sup> | 1         |
| EPID:5610   | Intermediate Epidemiology Data Analysis With SAS and R        | 3         |
| EPID:6400   | Epidemiology II: Advanced Methods                             | 4         |
| <b>Hours</b>  |   | <b>11</b> |
| <b>Second Year</b>  |   |           |
| <b>Fall</b>   |   |           |
| Elective course <sup>d</sup>  |   | 3         |
| Elective course <sup>d</sup>  |   | 3         |
| Elective course <sup>d</sup>  |   | 4         |
| <b>Hours</b>  |   | <b>10</b> |
| <b>Spring</b>   |   |           |
| Capstone Requirement <sup>e</sup>   |   |           |
| EPID:6000   | Independent Study in Epidemiology <sup>f</sup>                | 2         |
| EPID:6150   | Writing for Medical Journals                                  | 1         |
| EPID:6950   | Clinical Research Ethics                                      | 2         |
| <b>Hours</b>  |   | <b>5</b>  |
| <b>Total Hours</b>  |   | <b>37</b> |

a All core courses except CPH:6100 and CPH:7270 must be completed with a grade of C-plus or higher.

b 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.

c Taken first year in the fall and spring semesters for 0 s.h. and 1 s.h., respectively

d Students must earn a minimum of 10 s.h. in elective coursework with a grade of C-plus or higher; see the General Catalog for list of approved courses. Work with faculty advisor to determine appropriate coursework and sequence.

e While a student does not take a final examination of courses, the evaluation of the student for graduation is based upon a positive review of a mentored K or R grant or a mentored publishable research paper.

f The capstone requirement is completed under the independent study mentorship; work with faculty advisor for approval.