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I. MASTER OF SCIENCE IN EPIDEMIOLOGY — DEGREE REQUIREMENTS

1. Course Requirements
   The Epidemiology MS Degree requires 40 credit hours, of which no more than six credits may be at the 400 level. The remaining credits must be in 800 level graduate courses.

   Required - Core Epidemiology (19 Credits)
   - EPI 810 Introductory Epidemiology 3
   - EPI 812 Causal Inference 3
   - EPI 817 Epidemiology of Communicable Diseases 3
   - LCS/EPI 829 Design of Epidemiologic Studies and Clinical Trials 3
   - EPI 836 Practicum Epidemiology Methods 3
   - { EPI 815 Epidemiology of Cardiovascular Disease, or EPI 823 Cancer Epidemiology 3
   - EPI 828 Responsible Conduct of Research AND ALL Graduate School sessions in Responsible Conduct of Research series - non-credit (http://grad.msu.edu/rcr/)

   Required - Core Biostatistics (9 Credits)
   - EPI 808 Biostatistics I 3
   - EPI 809 Biostatistics II 3
   - EPI 826 Research Methods in Epidemiology 3

   Required - Core SAS (2 Credits)
   - EPI 851 SAS programming I 1
   - EPI 852 SAS programming II 1

   Electives: (Required - 6 Credits)
   - EPI 805 Readings in the Historical Roots of Epidemiological Thought
   - EPI 814 Nutritional Epidemiology
   - EPI 815 Cardiovascular Epidemiology
   - EPI 816 Perinatal Epidemiology
   - EPI 819 Spatial Epidemiology
   - EPI 820 Evidence-based Medicine (currently offered as Independent Study*)
   - EPI 823 Cancer Epidemiology
   - LCS/EPI 830 Epidemiologic Overview of Foodborne Diseases & Food Safety
   - EPI 835 Neuropsychiatric Epidemiology
   - STT/EPI 847 Analysis of Survival Data
   - EPI 890 Independent Study*
   - EPI 910 Themes in Contemporary Epidemiology
   - EPI 920 Advanced Methods in Epidemiology and Applied Statistics
   - EPI 950 Advanced Research Topics in Biostatistics
   - EPI 951 Latent Variable Modeling
   - EPI 952 Duration and Severity Analysis
   - EPI 953 Analytic Strategies for Observational Studies
   - EPI 977 Social Epidemiology
   - EPI 979 Advanced Topics Infectious Disease Epidemiology
   - EPI 899 Master's Thesis Research (4 Credits)
     A minimum of 4 credits is required and a maximum of 36 credits is allowable.
Independent Study Credits:
A maximum of three credits can be earned through independent study and credited as electives. Masters students may take independent study credits by making appropriate arrangements with a faculty member and completing the Application for Independent Study Form (Appendix A.1).

Scientific Integrity: All Epidemiology MS students must complete the entire set of MSU Graduate School workshops on Responsible Conduct of Research and earn the Certificate of Completion (http://grad.msu.edu/rcr/). All students must also enroll in EPI 828 (1 credit), and also complete the necessary online MSU Institutional Review Board (IRB) training, if the thesis work requires MSU IRB approval (http://www.humanresearch.msu.edu).

2. Academic Standards
   a. The minimum overall grade-point average (GPA) required for graduation is 3.0.
   b. In any given semester, a 3.0 cumulative GPA and a grade of 3.0 in any core course must be achieved to continue enrollment.
   c. The achievement of a grade below 3.0 in more than two courses (core or elective) removes the student from candidacy for the degree.
   d. A student who fails to meet minimum standards will be reviewed by the Department’s Graduate Program Committee (GPC) before being permitted to re-enroll.

3. Transfer Credits
   A maximum of 9 credits from graduate courses can be transferred toward the credit requirements for the MS. Prior courses that appear to match existing options in the department’s curriculum must be approved by the 1) Primary Advisor, 2) course Instructor of the potential equivalent departmental course(s), and 3) the Graduate Program Director (GPD). Prior courses that do not appear to match existing options must be approved by the 1) Primary Advisor and 2) The GPD. (Use Course Equivalence Form, Appendix A.2). In case of lack of consensus, resolution rests with the GPC. The transfer credit approval process should be accomplished within the first two semesters of enrollment.

4. Time Limits
   From initial enrollment, the student has six years to complete all requirements for the MS degree. It is the student’s responsibility to monitor this time frame.

5. Student Progress
   At the end of each semester, the student should prepare a detailed, updated program plan and timetable for completion of degree requirements (Course of Study Worksheet, Appendix A.3). This plan should be approved by the Primary Advisor (Thesis Advisor) and the Thesis Committee (in the later semesters) and filed with the Graduate Secretary.

6. Primary Advisor, Thesis Advisor, Thesis Committee
   A. Advisors
   A Primary Advisor is assigned at the beginning of the first year. It is the responsibility of the student to schedule regular meetings with the Primary Advisor to review student progress. Ordinarily, the Primary Advisor becomes the Thesis Advisor and the Thesis Committee Chair. Under some conditions it may be appropriate to arrange for a new Thesis Advisor.
B. Thesis Committee

The Thesis Advisor (Thesis Committee Chair) is a tenure-stream faculty member in the Department of Epidemiology and Biostatistics. Any other MSU faculty member can serve as Committee Chair with the approval of the Department Chair, provided that he/she has been previously approved as a committee member by The Graduate School. The Thesis Advisor will work with the student to select a Thesis Committee that will consist of the Thesis Advisor plus at least two additional tenure-stream faculty members (or any other MSU faculty members subject to The Graduate School approval). One of the two additional faculty members must also be from the Department of Epidemiology and Biostatistics. It is strongly recommended that at least one of the committee members has expertise in biostatistics and one has expertise in Epidemiology. A faculty member from another university may be called upon to serve as a committee member*.

The Thesis Committee should be selected as soon as possible after decisions regarding Thesis Advisor and thesis topic have been finalized. Optimally, the Thesis Committee will be formed and will meet before the end of the second semester. Committee members will sign the Committee Membership form (Appendix A.4). It is recommended that the student meet with their Thesis Advisor at least once a month while working on the thesis. It is strongly recommended that the student and Thesis Committee meet as a group to discuss the scope of the thesis before committee members sign the Thesis/Dissertation Proposal Form (Appendix A.5). The Thesis Committee will continue to meet as needed with the student to review progress.

*The Graduate School must approve all committee members. MSU tenure track and tenured faculty are automatically approved as committee members. All others from inside or outside MSU can only be approved after the department Graduate Secretary obtains and submits a package of documents to The Graduate School. As this process can take considerable time, students are encouraged to obtain approval before committee activity is anticipated.

7. Thesis Requirements

A. Master’s Thesis Content/Format

The purpose of the Master’s Thesis is to give students the opportunity to synthesize and apply their Epidemiology training to a health issue of their choice. We have identified four formats which are acceptable for an Epidemiology master’s thesis project. A rough outline of the tasks involved in each is provided. The scope of work statement on the Thesis/Dissertation Proposal Form (see Appendix A.5) should reflect the intended format of the thesis project. The MS thesis project should be substantial enough to yield one publishable scientific article in a peer reviewed journal of the field (or grant proposal worthy of submitting) and might be written up as a journal article that conforms to specifications of the faculty.

Possible thesis project formats*

1. Descriptive Epidemiology of a disease or condition, or a hypothesis testing study, using original data collection and analysis.

   A. Identify topic of interest/hypothesis to be tested
   B. Identify study population
   C. Develop/test data collection instrument(s) for reliability and validity
   D. Original data collection
E. Data entry and cleaning
F. Analysis
G. Identify strength/limitations of these data
H. Write up thesis

2. Descriptive Epidemiology of a disease or condition, or a hypothesis testing study, based on the analysis of an existing data set.

A. Identify topic of interest/hypothesis to be tested
B. Identify existing data set
C. Assess reliability/validity of data collection instruments and methods
D. Data cleaning
E. Analysis
F. Identify strength/limitations of these data
G. Write up thesis

3. Design of a hypothesis testing study following the NIH grant proposal format.

A. Objectives
B. Specific Aims
C. Background/Significance
D. Preliminary Studies/Progress Report
E. Research Design and Methods
F. Proposed Analysis and Presentation Tables/Figures
G. Write up thesis in the above format A – F

4. Critical review of the literature/meta-analysis, which is of publication quality.

A. Identify topic/hypothesis
B. Identify source articles
C. Evaluate quality of the studies
D. Conduct qualitative/quantitative review
E. Summarize conclusions
F. Write up thesis

*Examples of prior theses are available in the Graduate Secretary’s office and online at the MSU Library.

B. Human Subjects Protection for Master's Thesis

When applicable the thesis proposal should be submitted for approval to the MSU Human Research Protection Program (http://www.humanresearch.msu.edu) or the corresponding animal safety committee, when the research requires use of data from or contact with human participants or animal subjects. In some instances, students working on data from an ongoing research project with Institutional Review Board (IRB) approval will be asked to apply to the IRB as a coinvestigator. It is a program requirement that the MS student undertaking human subjects research must complete MSU’s tutorials (e.g., the online IRB tutorial and examination). Copies of the certificate from the IRB tutorial should be filed with the Graduate Secretary and the Thesis Advisor. The IRB project approval letter must be submitted with the final thesis document to the graduate school.
C. Thesis Defense

1. Students must be enrolled for at least one credit at the time of their defense.
2. Committee members must sign the Approval to Defend Form (Appendix A.7).

3. Thesis Sign-off Forms: Students should obtain the sign-off form (Thesis/Dissertation Defense Form, see Appendix A.8) from the Graduate Secretary and hand it to the Thesis Committee Chair (Thesis Advisor).

4. It is an MSU policy that all thesis defenses are open to the public. In addition, all Epidemiology faculty and students are invited and encouraged to attend. The student and Thesis Advisor shall appoint a faculty member from the Department of Epidemiology and Biostatistics, who is not a thesis committee member, to serve as an observer at the defense. The observer shall be identified at the time the defense is scheduled. The observer is invited to read the thesis prior to the defense. The role of the observer is to observe the presentation, be present during closed door deliberations, and contribute as s/he sees fit. The observer will have no vote.

5. Each thesis defense is scheduled to last approximately two hours and progress through the following stages: 1) Introduction of committee members; 2) Student oral presentation (30-60 minutes); 3) A question/answer session that is open to the public; 4) A question/answer session with student and committee members only; 5) A private deliberation by committee members without the student present, in which committee members vote on the Thesis defense outcome; and 6) A reuniting of the student and committee members at which time the student is informed of the committee decision. This may include revisions before final acceptance of the thesis.

D. Thesis Evaluation and Final Acceptance

One of the following outcomes is assigned by the Thesis Committee after the defense:
   a. Acceptable as is
   b. Acceptable with minor revisions
   c. Acceptable with major revisions
   d. Unacceptable

The first three outcomes constitute passing grades. All revisions must be communicated in writing. Students will be informed about the procedure for evaluating and accepting the revisions. For example, the Committee may turn the evaluation task over to the Thesis Committee Chair, or may delegate the authority to another committee member or members. Following the thesis defense, the form (Thesis/Dissertation Defense Form, see Appendix A.8) must be signed by all Committee members. The form will indicate the grade received as well as indicate if revisions are required. A final signature by the Thesis Committee Chair must be completed on the form after all revisions have been approved. Only then can the student be eligible for graduation. Students do not need to be enrolled when completing revisions or applying for graduation. If the final defense is not successful, the student has one more opportunity to make corrections and to defend successfully.

8. Masters Student Timeline

1. Before the beginning of the first semester meet with your Primary Advisor to discuss coursework plan and thesis research interests.
2. **Within** the first two semesters, meet with your Primary Advisor/Thesis Advisor to further define the scope of the thesis and identify a Thesis Committee.
3. Meet with the Thesis Committee to provide a brief overview of the thesis and a Masters Thesis/Project Proposal form that must be signed by each committee member.
4. **Turn** in the Masters Thesis/Project Proposal form to the Graduate Secretary. It is recommended that this be completed at the beginning of the third semester.
5. **Meet** with your Thesis Advisor (and Thesis Committee) as needed to complete the thesis and report on coursework progress. It is recommended that 6-8 weeks before the anticipated defense date, the entire thesis committee meets to agree that the thesis is defendable.
6. The “final” draft of the thesis MUST be submitted to each committee member at least 2 weeks before the defense date (preferably 4 weeks). Students should check with the Thesis Advisor and committee members because they may require more time to review the thesis.
7. Notify the Graduate Secretary at least two weeks before the thesis defense to allow time for scheduling and publicizing of the defense. If revisions in the written thesis are indicated, they should be completed as soon as possible. Students will not receive their Masters degree until revisions are completed, the Thesis Committee Chair has signed-off, and the thesis has been submitted to the Graduate School. **After December 17, 2010, only electronic theses submissions will be accepted by the Graduate School. However, Epidemiology continues to require at least one print copy for the department. The IRB project approval letter must be submitted with the final thesis document to the graduate school.** Remember that all aspects of the Masters Program must be completed within the six year time frame.
II. MASTER OF SCIENCE (MS) IN BIOSTATISTICS — DEGREE REQUIREMENTS

1. Course Requirements:

Plan A (Thesis Option):
The Epidemiology MS Degree requires 40 credit hours, of which no more than six credits may be at the 400 level. The remaining credits must be in 800 level graduate courses.

Plan B (Non-Thesis Option):
This MS Degree requires 40 credit hours at the 800 level.

Required — Core Biostatistics (13 Credits)
EPI 808B Advanced Biostatistics 3
EPI 826B Categorical Data Analysis 3
\{ EPI 853B Statistical Computing, or \}
\{ STT 461 Computations in Probability and Statistics \} 3
EPI 855 Biostatistical Modeling in Genomic Data Analysis 3
EPI 856 Statistical Consulting 1

Required — Core Epidemiology (6 Credits)
EPI 810 Introductory Epidemiology 3
LCS/EPI 829 Design of Epidemiologic Studies and Clinical Trials 3

Required — Responsible Conduct of Research (1 Credit)
EPI 828 Seminar in Responsible Conduct of Research 1
and ALL Graduate School sessions in Responsible Conduct of Research series
(http://grad.msu.edu/rcr/) non-credit

Required - Plan B only
EPI 890 Independent Study-Capstone Project (1 credit) 1

Electives — Biostatistics, Statistics/Econometrics, Epidemiology
(total 16 Credits for Plan A, or 19 credits for Plan B).

Biostatistics/Statistics/Econometrics (13 Credits)
STT/EPI 847 Analysis of Survival Data 3
EPI 851 SAS Programming I: Essentials 1
EPI 852 SAS Programming II: Data Management & Analysis 1
EPI 858 Clinical Trials 3
EPI 920 Advanced Methods in Epidemiology & Applied Statistics 3
EPI 950 Advanced Biostatistical Methods in Epidemiology 3
EPI 951 Latent Variable Modeling 3
EPI 952 Duration and Severity Analysis 3
EPI 953 Analytic Strategies for Observational Studies 3
STT 801 Design of Experiments 3
STT 825 Sample Surveys 3
STT 861 Theory of Probability and Statistics I 3
STT 862 Theory of Probability and Statistics II 3
EC/STT 821A Cross Section and Panel Data Econometrics I 3
EC/STT 821B Cross Section and Panel Data Econometrics II 3
FW/STT 850 Applied Multivariate Statistical Methods 3
Other courses by approval of the Department

**Epidemiology (3 Credits)**
- EPI 805 Readings in the Historical Roots of Epidemiological Thought
- EPI 812 Causal Inference in Epidemiology
- EPI 813 Investigation of Disease Outbreaks
- EPI 814 Nutritional Epidemiology
- EPI 815 Epidemiology of Cardiovascular Disease
- EPI 816 Perinatal Epidemiology
- EPI 817 Epidemiology of Communicable Disease
- EPI 819 Spatial Epidemiology
- EPI 820 Evidence-based Medicine (*currently offered as Independent Study*)
- EPI 823 Cancer Epidemiology
- EPI/LCS 830 Epidemiologic Overview of Foodborne Diseases & Food Safety
- EPI 835 Neuropsychiatric Epidemiology
- EPI 890 Independent Study*
- EPI 910 Themes in Contemporary Epidemiology
- EPI 977 Social Epidemiology
- EPI 979 Advanced Topics Infectious Disease Epidemiology

*Independent Study Credits:*
A maximum of **three credits** can be earned through independent study and credited as electives. Masters students may take independent study credits by making appropriate arrangements with a faculty member and completing the Application for Independent Study Form (Appendix A.1).

**Plan B Independent Study-Capstone Project**

a. The MS candidate (“Candidate”) will register for 1 credit of Independent Study under EPI 890. The Candidate will meet with his/her academic advisor and identify a faculty member in the Department of Epidemiology and Biostatistics who may be a potential match to direct their “Project.” Once an agreement is reached, the student and the Project Director will work together with the goal of completing the Project by the last semester of the MS program. This faculty member, if different from the academic advisor, who supervises the Project, will be considered the “Research Advisor” for the student.

b. The Project will be accomplished in one of the following formats:

1. An expanded exploration of a topic or a statistical method/model from one of the required or elective biostatistics courses through simulation or systematic review.
2. A statistical analysis of an extant data set. It should include a discussion and application of methods, tables and figures as appropriate, and a summary of the findings.
3. A statistical analysis plan (SAP) for a clinical trial or a hypothetical proposal of the research advisor’s choice

c. The end product will consist of a short written report summarizing the Project, 10-15 pages in length, reviewed by the “Research Advisor.” The Candidate will be asked to give a 15- to 20-minute professional quality presentation of the main highlights of the Project to an audience of his/her peers and to other faculty members within the last two weeks of the semester. The presentation will be evaluated by a minimum of three faculty members. It is
expected that the presentation will encourage discussion and stimulate constructive feedback to the Candidate.

**Scientific Integrity:** All Epidemiology MS students must complete the entire set of MSU Graduate School workshops on Responsible Conduct of Research earning the Certificate of Completion ([http://grad.msu.edu/rcr/](http://grad.msu.edu/rcr/)), one credit of EPI 828, and complete the necessary online MSU Institutional Review Board (IRB) training, if the thesis work requires MSU IRB approval ([http://www.humanresearch.msu.edu](http://www.humanresearch.msu.edu)).

EPI 899 Master’s Thesis Research (4 Credits for Plan A only)
A minimum of 4 credits is required and a maximum of 36 credits is allowable.

2. **Academic Standards**
   a. The minimum overall grade-point average (GPA) required for graduation is 3.0.
   b. In any given semester, a 3.0 cumulative GPA and a grade of 3.0 in any core course must be achieved to continue enrollment.
   c. The achievement of a grade below 3.0 in more than two courses (core or elective) removes the student from candidacy for the degree.
   d. A student who fails to meet minimum standards will be reviewed by the Department's Graduate Program Committee (GPC) before being permitted to re-enroll.

3. **Transfer Credits**
   A maximum of 9 credits from graduate courses can be transferred toward the credit requirements for the MS. Prior courses that appear to match existing options in the department’s curriculum must be approved by the 1) Primary Advisor, 2) course Instructor of the potential equivalent departmental course(s), and 3) the Graduate Program Director (GPD). Prior courses that do not appear to match existing options must be approved by the 1) Primary Advisor and 2) The GPD. (Use Course Equivalence Form, Appendix A.2). In case of lack of consensus, resolution rests with the GPC. The transfer credit approval process should be accomplished within the first two semesters of enrollment.

4. **Time Limits**
   From initial enrollment, the student has six years to complete all requirements for the MS degree. It is the student’s responsibility to monitor this time frame.

5. **Student Progress**
   At the end of each semester, the student should prepare a detailed, updated program plan and timetable for completion of degree requirements (Course of Study Worksheet, Appendix A.3). This plan should be approved by the Primary Advisor and filed with the Graduate Secretary.

6. **Primary Advisor, Thesis Advisor, Thesis Committee**
   **A. Advisors**
   The Primary Advisor is assigned prior to the beginning of the first year. It is the responsibility of the student to schedule regular meetings with the Primary Advisor to review student progress. Ordinarily, the Primary Advisor becomes the Thesis Advisor and the Thesis Committee Chair. Under some conditions it may be appropriate to arrange for a new Thesis Advisor.

   **B. Thesis Committee (Plan A only)**
   The Thesis Advisor (Thesis Committee Chair) is a tenure-stream faculty member in the Department of Epidemiology and Biostatistics. Any other MSU faculty member can serve
as Committee Chair with the approval of the Department Chair, provided that he/she has been previously approved as a committee member by The Graduate School. The Thesis Advisor will work with the student to select a Thesis Committee that will consist of the Thesis Advisor plus at least two additional tenure-stream faculty members (or any other MSU faculty members subject to The Graduate School approval). One of the two additional faculty members must also be from the Department of Epidemiology and Biostatistics. It is strongly recommended that at least one of the committee members has expertise in biostatistics and one has expertise in Epidemiology. A faculty member from another university may be called upon to serve as a committee member.*

The Thesis Committee should be selected as soon as possible after decisions regarding Thesis Advisor and thesis topic have been finalized. Optimally, the Thesis Committee will be formed and will meet at the end of the second semester. Committee members will sign the Committee Membership form (Appendix A.4). It is recommended that the student meet with their Thesis Advisor at least once a month while working on the thesis. It is strongly recommended that the student and Thesis Committee meet as a group to discuss the scope of the thesis before committee members sign the Thesis/Dissertation Proposal Form (Appendix A.5). The Thesis Committee will continue to meet as needed with the student to review progress.

*The Graduate School must approve all committee members. MSU tenure track and tenured faculty are automatically approved as committee members. All others from inside or outside MSU can only be approved after the department Graduate Secretary obtains and submits a package of documents to The Graduate School. As this process can take considerable time, students are encouraged to obtain approval before committee activity is anticipated.

7. Thesis Requirements (paragraphs A through D, apply only to Plan A)

A. Master’s Thesis Content/Format

The purpose of the Master’s thesis is to give students the opportunity to use modern biostatistical methods to effectively analyze complex medical and public health data and effectively communicate the findings with research scientists in interdisciplinary collaborations. It will use probabilistic and statistical reasoning and theory to address standard or non-standard problems arising in medicine and public health research. We have identified the following components for a typical Master’s thesis: (1) Description of the design of a research study in medicine and public health, including the research question(s), population selection, sample size justification and hypotheses to be tested. (2) Statistical analysis plan for the proposed hypotheses. (3) Analysis and interpretation of the quantitative results, including graphical and tabular displays, descriptive statistics, and statistical inferences.

Examples of prior theses are available in the Graduate Secretary's office and online at the MSU Library.

B. Human Subjects Protection for Master's Thesis

When applicable the thesis proposal should be submitted for approval to the MSU Human Research Protection Program (http://www.humanresearch.msu.edu) or the corresponding animal safety committee, when the research requires use of data from or contact with human participants or animal subjects. In some instances, students working on data from an ongoing research project with Institutional Review Board (IRB) approval
will be asked to apply to the IRB as a coinvestigator. It is a program requirement that the MS student undertaking human subjects research must complete MSU’s tutorials (e.g., the online IRB tutorial and examination). Copies of the certificate from the IRB tutorial should be filed with the Graduate Secretary and the Thesis Advisor. **The IRB project approval letter must be submitted with the final thesis document to the graduate school.**

C. Thesis Defense

1. Students must be enrolled for at least one credit in any course, or for thesis credits, at the time of their defense.
2. Committee members must sign the Approval to Defend form (Appendix A.7).
3. Thesis Sign-off Forms: Students should obtain the sign-off form (Thesis/Dissertation Defense Form, see Appendix A.8) from the Graduate Secretary and hand it to the Thesis Committee Chair (Thesis Advisor).
4. It is an MSU policy that all thesis defenses are open to the public. In addition, all Department faculty and students are invited and encouraged to attend. The student and Thesis Advisor shall appoint a faculty member from the Department of Epidemiology and Biostatistics, who is not a thesis committee member, to serve as an observer at the defense. The observer shall be identified at the time the defense is scheduled. The observer is invited to read the thesis prior to the defense. The role of the observer is to observe the presentation, be present during closed door deliberations, and contribute as s/he sees fit. The observer will have no vote.
5. Each thesis defense is scheduled to last approximately two hours and progress through the following stages: 1) Introduction of committee members; 2) Student oral presentation (30-60 minutes); 3) A question/answer session that is open to the public; 4) A question/answer session with student and committee members only; 5) A private deliberation by committee members without the student present, in which committee members vote on the Thesis defense outcome; and 6) A reuniting of the student and committee members at which time the student is informed of the committee decision. This may include revisions before final acceptance of the thesis.

D. Thesis Evaluation and Final Acceptance

One of the following outcomes is assigned by the Thesis committee after the defense:

a. Acceptable as is
b. Acceptable with minor revisions
c. Acceptable with major revisions
d. Unacceptable

The first three outcomes constitute passing grades. All revisions must be communicated in writing. Students will be informed about the procedure for evaluating and accepting the revisions. For example, the committee may turn the evaluation task over to the Thesis Committee Chair, or may delegate the authority to another committee member or members. Following the thesis defense, the form (Thesis/Dissertation Defense Form, see Appendix A.8) must be signed by all committee members. The form will indicate the grade received as well as indicate if revisions are required. A final signature by the Thesis Committee Chair must be completed on the form after all revisions have been approved. Only then can the student be eligible for graduation. Students do not need to be enrolled
when completing revisions or applying for graduation. If the final defense is not successful, the student has one more opportunity to make corrections and to defend successfully.

8. Masters Student Timeline

Note: paragraphs 2 through 7 are only relevant for students following Plan A (Thesis option).

1. As soon as possible after orientation, meet with your Primary Advisor to discuss your coursework plan and research interests.
2. Within the first two semesters, meet with your Primary Advisor/Thesis Advisor to further define the scope of the thesis and identify a Thesis Committee.
3. Meet with the Thesis Committee to provide a brief overview of the thesis and a Masters Thesis/Project Proposal form that must be signed by each committee member.
4. Turn in the Masters Thesis/Project Proposal form to the Graduate Secretary. It is recommended that this be completed at the beginning of the third semester.
5. Meet with your Thesis Advisor (and Thesis Committee) as needed to complete the thesis and report on coursework progress. It is recommended that 6-8 weeks before the anticipated defense date, the entire thesis committee meets to agree that the thesis is defendable.
6. The “final” draft of the thesis MUST be submitted to each Thesis Committee member at least 2 weeks before the defense date (preferably 4 weeks). Students should check with the Thesis Advisor and Committee members because they may require more time to review the thesis.
7. Notify the Graduate Secretary at least two weeks before the thesis defense to allow time for scheduling and publicizing of the defense. If revisions in the written thesis are indicated, they should be completed as soon as possible. Students will not receive their Masters degree until revisions are completed, the Thesis Committee Chair has signed-off, and the thesis has been submitted to the Graduate School. After December 17, 2010, only electronic theses submissions will be accepted by the Graduate School. However, the Department of Epidemiology and Biostatistics continues to require at least one print copy for departmental archive. The IRB project approval letter must be submitted with the final thesis document to the Graduate School. Remember that all aspects of the Masters Program must be completed within the six year time frame.
III. DOCTOR OF PHILOSOPHY IN EPIDEMIOLOGY — DEGREE REQUIREMENTS

1. Course Requirements

Courses: In addition to the required MS coursework, the PhD student must complete at least 51 credit hours distributed between core required coursework, elective coursework or faculty-guided learning experiences (e.g. independent study), and dissertation research. See section 4 below for more details on credit transfer and course equivalencies.

Required Epidemiology Core Courses (6 credits)
EPI 805 Readings in the Historical Roots of Epidemiological Thought 3
EPI 910 Contemporary Issues 3

Required Biostatistics Core Courses (choose two courses, 6 credits)
EPI 855 Biostatistical Modeling in Genomic Data Analysis 3
EPI 920 Advanced Methods in Epidemiology & Applied Statistics 3
EPI 950 Advanced Biostatistical Methods in Epidemiology 3
EPI 952 Duration and Severity Analysis 3
EPI 953 Analytic Strategies for Observational Studies 3

Elective Courses (15 credits are required from among these choices; see Masters Program for names of elective courses)
EPI 814 Nutritional Epidemiology
EPI 815 Cardiovascular Epidemiology
EPI 816 Perinatal Epidemiology
EPI 819 Spatial Epidemiology
EPI 820 Evidence-based Medicine (currently offered as Independent Study*)
EPI 823 Cancer Epidemiology
LCS/EPI 830 Epidemiologic Overview of Foodborne Diseases & Food Safety
EPI 835 Neuropsychiatric Epidemiology
STT/EPI 847 Analysis of Survival Data
EPI 910 Themes in Contemporary Epidemiology
EPI 920 Advanced Methods in Epidemiology and Applied Statistics
EPI 950 Advanced Research Topics in Biostatistics
EPI 951 Latent Variable Modeling
EPI 952 Duration and Severity Analysis
EPI 953 Analytic Strategies for Observational Studies
EPI 990 Independent Study*
EPI 977 Social Epidemiology
EPI 979 Advanced Topics Infectious Disease Epidemiology

Courses from outside the department may also be used after approval by Primary Advisor and Department Graduate Program Committee.

EPI 999 Dissertation Research (24 credits)
A minimum of 24 dissertation research credits is required for graduation, and a maximum of 36 credits is allowed.

*Independent Study Credits:
Doctoral students may take independent study credits by making appropriate arrangements with a supervisory faculty member, completing the Application for Independent Study, and registering for EPI 990. A maximum of nine credits can be earned through independent study and credited as electives (Independent Study Form, Appendix A.1).
Scientific Integrity: All Epidemiology PhD students must complete the entire set of MSU Graduate School workshops on Responsible Conduct of Research earning the Certificate of Completion (http://grad.msu.edu/rcr/), one credit of EPI 828, and, if the dissertation work requires MSU IRB approval, complete the necessary online MSU Institutional Review Board (IRB) training (http://www.humanresearch.msu.edu).

2. Other Requirements and Opportunities for Professional Development:
The PhD program requires students to be resident as a full-time student for 2 consecutive semesters involving the completion of at least six credits of graduate work each semester. During this time the student is expected to be a full-time participant in the academic life of the department, the college, and the university, with attendance and engagement in research work, meetings, the department’s seminars, grand rounds, and other appropriate learning experiences pertinent to the content of the PhD student’s future research career. When in residence (i.e., full-time status—minimum of six credits-- for two consecutive semesters) all PhD students are required to participate in:

1) The PhD Journal Club, and attend 7 journal club meetings scheduled for the academic year (i.e. the 2 consecutive semesters in residence), including one in which student does presentation, and
2) The Epidemiology Seminar series (Thurs. 4 PM series), and attend at least 80% of all presentations.

There is a sign-in sheet at each seminar and journal club; and attendance report will be sent each semester to the student and their Adviser. PhD students are encouraged to seek out research collaborations and initiate research activities early in their graduate program.

3. Academic Standards
- The minimum overall grade-point average (GPA) required for graduation is 3.0.
- In any given semester, a 3.0 cumulative GPA and a grade of 3.0 in any core course must be achieved to continue enrollment.
- The achievement of a grade below 3.0 in more than two courses (core or elective) removes the student from candidacy for the degree.
- A student who fails to meet minimum standards will be reviewed by the Department's Graduate Program Committee (GPC) before being permitted to re-enroll.

4. Transfer Credits and Course Equivalencies
For each of the following scenarios complete the Course Equivalence Form (Appendix A.2).

a. For students who received their MS degree in Epidemiology from MSU:
   - A maximum of 9 semester credits from the MSU MS program can be counted toward the 51 credit PhD (Total credits: 51 - 9 = 42 credits).

b. For students who received their MS/MPH in Epidemiology from another institute: *
   - A maximum of 9 semester credits from graduate courses can be transferred toward the credit requirements for the PhD (Total credits: 51 PhD - 9 = 42 credits). These courses must match existing course options in the MSU program and be approved by the 1) Primary Advisor, 2) course instructors of the equivalent MSU Epidemiology courses, and 3) Department Graduate Program Director.
Students must obtain course equivalency approvals for all previous MS/MPH in epidemiology coursework to ensure courses taken as part of their previous degree are equivalent to the MSU MS in Epidemiology core course requirements. Any deficiencies will require enrollment in the MSU Epidemiology core MS course; these credits are in addition to required PhD credits.

c. For students who have not received an advanced degree in Epidemiology there are two admission options:
   - **Option 1: Sequential MS and PhD degrees:** Admission to the MS program, followed by later admission to the PhD after demonstration of Epidemiologic skills in the Masters program. This option is the ordinary route to the PhD.
   - **Option 2: PhD only:** Direct admission to the PhD program only occurs under special circumstances.

**Option 1 (Sequential):** After completing the required 40 credits of the MS program (see requirements for MS in Epidemiology, page 1), the student can transfer 9 of these MS credits towards the PhD program, thereby reducing the required number of PhD credits from 51 to 42. Total credits required for sequential MS (40) and PhD (42) degrees = 82 credits.

If students completed graduate courses prior to enrolling in a graduate Epidemiology degree program at MSU, a maximum of 9 semester credits from these courses can be counted toward the MS, thereby reducing the required number of MS credits from 40 to 31. These courses must match existing course options in the MSU program and be approved by the 1) Primary Advisor, 2) course instructors of the equivalent MSU Epidemiology courses, and 3) Department Graduate Program Director. If such credits are successfully transferred, the total number of required credits for the sequential MS (31) and PhD (42) degrees = 73 credits.

**Option 2 (PhD only):** Under special circumstances students can be admitted directly to the MSU PhD program in Epidemiology. Such students must complete all 36 course credit requirements of the MS program. They do not have to complete the 4 thesis credits*, because they will not receive the MS degree. These 36 MS credits will be added to the 51 credits required by the PhD, so the total credits required for the PhD-only program is 87.

*Because PhD only students (no previous Masters degree in Epidemiology) do not author an MS thesis they will be required to submit, in lieu of this thesis, one of the following first-authored works: 1) a previous peer-reviewed publication; 2) a manuscript of publishable quality; 3) a grant application judged likely to be funded. This work will be submitted to their Primary Advisor and Department Graduate Program Committee prior to taking the comprehensive examination.

If students have completed graduate courses prior to entering the PhD Epidemiology program at MSU, a maximum of 9 semester credits from these courses can be counted toward the PhD. These courses must match existing course options in the MSU Epidemiology program and be approved by the 1) Primary Advisor, 2) course instructors of the equivalent MSU epidemiology courses, and 3) Department Graduate Program Director. If such credits are successfully transferred, the total required number of credits (87) for the PhD only degree will be 87 – 9 = 78.

5. **Time Limits**

   Students have 8 years from the time of matriculation to complete the PhD program.
6. **Student Progress**

At the end of each semester, the student should update their coursework plan on the Course of Study Worksheet (see Appendix A.3) and timetable for completion of degree requirements. This plan should be approved by the Primary Advisor (Dissertation Advisor) and filed with the Graduate Secretary.

7. **Primary Advisor, Dissertation Advisor, Dissertation Committee**

   **A. Advisors**

   It is the responsibility of the student to schedule regular meetings with the Primary Advisor. Ordinarily, the Primary Advisor becomes the Dissertation Advisor and the Dissertation Committee Chair. Under some conditions it may be appropriate to arrange for a new Dissertation Advisor. This decision will be reviewed by the Department Graduate Program Committee and the new Dissertation Advisor will become the student’s Primary Advisor.

   **B. Dissertation Committee (Guidance Committee)**

   The Dissertation Advisor (Dissertation Committee Chair) is a tenure-stream faculty member in the Department of Epidemiology and Biostatistics. Any other MSU faculty member can serve as Committee Chair with the approval of the Department Chair, provided that he/she has been previously approved as a committee member by The Graduate School. The advisor will work with the student to select a Dissertation Committee that will consist of the Dissertation Advisor plus at least three additional tenure-stream faculty members (or any other MSU faculty members subject to The Graduate School approval). One of the three additional faculty members must also be from the Department of Epidemiology and Biostatistics and one must be from another department within or outside MSU. It is required that at least one of the committee members has expertise in epidemiology and one has expertise in biostatistics.*

   This Dissertation Committee should be selected as soon as possible after the Dissertation Advisor has been designated and the dissertation topic has been chosen. Optimally, the Dissertation Committee will be formed as soon as possible after successful completion of the comprehensive examination. Committee members will sign the Committee Membership Form (Appendix A.4).

   *The Graduate School must approve all committee members. MSU tenure track and tenured faculty are automatically approved as committee members. All others from inside or outside MSU can only be approved after the department Graduate Secretary obtains and submits a package of documents to The Graduate School. As this process can take considerable time, students are encouraged to obtain approval before committee activity is anticipated.

8. **Written Comprehensive Examination**

   **Expected Timeline**

   All PhD students (except as noted below) are required to take a written comprehensive examination at the end of the first academic year of the PhD program. Each student has two opportunities to pass the examination which includes both Epidemiology and biostatistics sections. The examination is usually offered twice a year; typically at the beginning of the fall and spring semesters. Students who are admitted to the PhD program with no previous
masters-level training in Epidemiology, or who have not taken all of the required core courses by the end of the first year, may delay taking the examination until the end of the second year of study.

Any student who wishes to request an exception to the above timeline must file a written petition to the Graduate Program Committee (GPC). The petition should document the reasons for the intended delay and must include a specific timetable for completing the exam. The petition must be submitted to the GPC at least 4 months prior to the scheduled examination date. The GPC will have up to 4 weeks to either approve or deny the petition.

It is the responsibility of each student and his/her major advisor to plan the sequence of core and elective courses so that the student is in the best position to succeed at the examination. The Graduate Program Director (GPD) is available to answer questions and address any concerns.

Review of Examination Results

All students are strongly encouraged to review the graded examination. This review can be accomplished by contacting the Graduate Secretary (GS), who will coordinate a meeting between the student, advisor and GPD, if one is indicated.

Rules for Scheduling Examinations

Students who are scheduled to take the examination but withdraw before or on the date of the exam will forfeit one of their two opportunities to take the examination (and so, in effect, will fail that examination). Students who miss the examination due to an unanticipated illness (or other non-medical problem) will be required to submit a medical letter (or equivalent documentation for a non-medical problem) to the GPC as soon as possible, and will be expected to take the exam on an agreed upon re-take day (typically the following week).

Students who fail to pass either or both the Epidemiology and biostatistics sections of the examination on the first attempt are expected to re-take the failed section(s) the next time the examination is offered. Any student who wishes to request an exception to this requirement must file a written petition to the GPC at least 4 months prior to the next scheduled examination. The petition should document the reasons for the intended delay and must include a specific timetable for completing the exam. The GPC will have up to 4 weeks to either approve or deny the petition.

Students who exhaust their two chances to take the examination without achieving a passing grade will be reviewed by the GPC, who will make a recommendation to the faculty that may involve dismissal from the PhD program.

9. PhD Dissertation Requirements

A. PhD Dissertation Content/Format

The purpose of the PhD dissertation is to apply Epidemiology training to a health issue and make a substantive contribution to the field. Two formats are acceptable for a PhD Epidemiology dissertation project. The PhD dissertation project should be substantial enough after suitable peer review to: 1) yield three publishable scientific articles, or (2) be publishable as a full-length monograph by a university publishing house or other approved
publishers. Students are encouraged to elect the first option to expedite publication in peer-reviewed journals.

The dissertation itself will follow standards of the field, according to the specifications of the dissertation committee. One standard model* includes: 1) a chapter describing the potential scientific and public health significance of the research on the selected topic or topics, as well as the hypotheses, research questions, or specific aims of the project, 2) a careful and thorough scholarly review of pertinent theory and literature that serve as background for the project, 3) a methodology chapter that explains the research approach in detail, including pertinent statistical methods, 4) three publishable chapters where the study results are presented (e.g., one for each publishable scientific article), and 5) a final discussion/conclusion chapter that summarizes the main facets of new evidence, reviews limitations, places the results into context with past theory and evidence, outlines directions for future research and provides an overview summary, including implications with respect to theory, new research, and (when pertinent) public health practice.

*Examples of prior dissertations are available in the Graduate Secretary’s office and online at the MSU Library.

B. Dissertation Proposal

Following successful completion of the comprehensive examination, each PhD student must prepare a Thesis/Dissertation Proposal Form (Appendix A.5), as well as a dissertation proposal as described in this section. The dissertation research project described in the proposal must constitute hypothesis-based original research in Epidemiology and public health of sufficient quality and depth to warrant publication after peer review.

The Dissertation Proposal should contain: 1) a description of the proposed topic; 2) hypotheses or research questions and specific aims; 3) the scientific and public health significance of the proposed research; 4) a review of theory, prior evidence, and research issues pertinent to the topic; 5) the study design, methods, and analyses required for completion; and 6) a bibliography with a list of citations and resources consulted. This Dissertation Proposal is to be developed in preparation for the PhD candidate’s independent research, which is to be mentored and guided primarily by the Dissertation Advisor, with the assistance of the Dissertation Committee. The dissertation proposal will become an element in the student’s progress report as filed with the department.

C. Oral Presentation of the Dissertation Proposal

1. After passing the comprehensive examination students must schedule a meeting of the Dissertation Committee at which time: 1) students will give an oral presentation of the dissertation proposal; and 2) students will provide a list of courses completed. Students should submit their written dissertation proposal to the Dissertation Committee at least two weeks before the oral presentation. At this Dissertation Committee meeting students will receive input on merits of the dissertation proposal, potential modifications, and additional courses that may be needed to successfully complete the dissertation. The student and Dissertation Advisor are encouraged to invite at least one faculty member from the Department of Epidemiology who is not serving on the Dissertation Committee to be present and provide additional feedback at the oral presentation of the dissertation proposal.

2. Following the Dissertation Proposal Presentation, two forms must be completed by the student and the Dissertation Committee: 1) The Thesis/Dissertation Proposal Form
(Appendix A.5); and 2) Report of the Dissertation Committee (Appendix A.6) listing all degree requirements. Both forms should be submitted to the Graduate Secretary.

3. Students can receive no more than 6 dissertation credits (EPI 999) for dissertation proposal development before the Dissertation Proposal has obtained final committee approval.

D. Human Subjects Protection for PhD Dissertation

When applicable the thesis proposal should be submitted for approval to the MSU Human Research Protection Program (http://www.humanresearch.msu.edu) or the corresponding animal safety committee, when the research requires use of data from or contact with human participants or animal subjects. In some instances, students working on data from an ongoing research project with Institutional Review Board (IRB) approval will be asked to apply to the IRB as a secondary investigator. It is a program requirement that the MS student undertaking human subjects research must complete MSU’s tutorials (e.g., the online IRB tutorial and examination). Copies of the certificate from the IRB tutorial should be filed with the Graduate Secretary and the Thesis Advisor.

E. Dissertation Defense

1. Students must be enrolled for at least one credit in any course, or for dissertation credits, at the time of their defense.
2. Committee members must sign the Approval to Defend Form (Appendix A.7).
3. Dissertation Sign-off Forms: Students should obtain the sign-off form (Thesis/Dissertation Defense Form, see Appendix A.8) from the Graduate Secretary and hand it to the Thesis Committee Chair (Thesis Advisor).
4. It is an MSU policy that all dissertation defenses are open to the public and all Epidemiology faculty and students are invited and encouraged to attend. In addition, the student and Dissertation Advisor shall appoint one faculty member from the Department of Epidemiology and Biostatistics, who are not a dissertation committee member, to serve as an observer at the defense. The observer shall be identified at the time the defense is scheduled. The observer is invited to read the dissertation prior to the defense. The role of the observer is to observe the presentation, be present during closed door deliberations, and contribute as s/he sees fit. The observer will have no vote. The dissertation should be scheduled so that the observer can attend to provide additional feedback.
5. Each final Dissertation defense is scheduled to last approximately two hours and progress through the following stages: 1) Introduction of committee members; 2) Student oral presentation (30-60 minutes); 3) A question/answer session that is open to the public; 4) A question/answer session with student and committee members only; 5) A private deliberation by committee members without the student present, in which committee members vote on the Dissertation defense outcome; and 6) A reuniting of the student and committee members at which time the student is informed of the committee decision. This may include revisions before final acceptance of the Dissertation.

F. Dissertation Evaluation and Final Acceptance

One of the following outcomes is assigned by the committee after the defense:

- Acceptable as is
• Acceptable with minor revisions
• Acceptable with major revisions
• Unacceptable

The first three outcomes constitute passing grades. Any revisions students need to incorporate should be communicated in writing by committee members, or if provided orally during the defense, should be recorded by the student. A procedure and timeline for evaluating whether the revisions are acceptable should then be determined. The committee may turn this evaluation task over to the Dissertation Chair, or may delegate the authority to another committee member or members.

10. PhD Student Timeline

1. Initiate meeting with Primary Advisor to discuss coursework plan and dissertation research interests.
2. Begin coursework.
3. Take the written comprehensive examination within the first year of the PhD program. Students may petition for an exception.
4. The Dissertation Committee (see section 7.B) should be formed after successful completion of the comprehensive examination.
5. After forming the dissertation committee, prepare a written dissertation proposal.
6. Present the dissertation proposal to the Dissertation Committee. This presentation is open to the public. Complete and submit the two required forms.
7. Obtain IRB approval.
8. Pursue the research described in the dissertation proposal and complete any additional coursework as needed.
9. Meet with the Dissertation Advisor and with the Dissertation Committee as needed.
10. Submit a draft of the complete dissertation to the Dissertation Committee at least three weeks before the final dissertation defense date. The student should check with the Dissertation Advisor and committee members because they may require more time to review the dissertation.
11. Students must notify the Graduate Secretary at least two weeks before the dissertation defense to allow for scheduling and publicizing of the defense.
12. Students must be enrolled for at least one credit during the semester of their final defense.
13. Defend the dissertation; the protocol for the defense is described above. The final dissertation defense is open to the public.
14. Following the dissertation defense, if revisions in the written dissertation are indicated, it is recommended, though not required, that revisions be completed within the same semester. Students will not receive their PhD degree until revisions are completed, the Dissertation Committee Chair has signed off, and the dissertation has been submitted to the Graduate School. (After December 17, 2010, only electronic dissertation submissions will be accepted). The IRB project approval letter must be submitted with the final dissertation document to the graduate school. Students do not need to be enrolled when completing revisions or applying for graduation. Remember that all aspects of the PhD Program must be completed within the eight year time frame.
### IV. DOCTOR OF PHILOSOPHY IN BIOSTATISTICS DEGREE REQUIREMENTS

The PhD in Biostatistics program offers three tracks:

(i) Design and Analysis of Medical Studies,
(ii) Big Data & Statistical Genetics, and
(iii) Biometry path, a flexible option for students with diverse interests.

The course requirements for the three tracks differ. In addition to the required MS coursework, all PhD students must complete at least 51 credit hours distributed between core required coursework, elective coursework or faculty-guided learning experiences (e.g., independent study), and dissertation research. See section 4 below for more details on credit transfer and course equivalencies.

#### 1. Course Requirements

**Required — Core Biostatistics for all tracks (9 Credits)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPI 860 Advanced Statistical Inference</td>
<td>3</td>
</tr>
<tr>
<td>STT 867 Theory of Linear Models</td>
<td>3</td>
</tr>
<tr>
<td>STT 868 Mixed models</td>
<td>3</td>
</tr>
</tbody>
</table>

Required for track (i) (3 Credits)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPI 858 Clinical Trial I</td>
<td>3</td>
</tr>
<tr>
<td>EPI 859 Clinical Trial II</td>
<td>3</td>
</tr>
<tr>
<td>EPI 952 or STT 847 Duration (Survival) Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

Required for track (ii) (3 Credits)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPI 855 or STT 855 Statistical Genetics</td>
<td>3</td>
</tr>
<tr>
<td>CSE 231 or CSE 232 Introduction to Programming</td>
<td>3</td>
</tr>
<tr>
<td>STT 465 Bayesian Methods</td>
<td>3</td>
</tr>
</tbody>
</table>

Required for track (iii) (3 Credits)

Can be selected from the list of Biostatistics electives. 3

**Required — Core Epidemiology (3 Credits)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epi 810 Introductory Epidemiology</td>
<td>3</td>
</tr>
</tbody>
</table>

**Electives* — Biostatistics, Statistics/Econometrics, Computer Science, Epidemiology, Animal Science (11 credits)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPI 880 Selected Topics in Biostatistics</td>
<td>3</td>
</tr>
<tr>
<td>EPI 920 Advanced Methods in Epidemiology &amp; Applied Statistics</td>
<td>3</td>
</tr>
<tr>
<td>EPI 950 Advanced Biostatistical Methods in Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>EPI 951 Latent Variable Modeling</td>
<td>3</td>
</tr>
<tr>
<td>EPI 952 Duration and Severity Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EPI 953 Analytic Strategies for Observational Studies</td>
<td>3</td>
</tr>
<tr>
<td>EPI 990 Independent Study**</td>
<td>3</td>
</tr>
<tr>
<td>EPI 812 Causal Inference</td>
<td>3</td>
</tr>
<tr>
<td>STT 801 Design of Experiments</td>
<td>3</td>
</tr>
<tr>
<td>STT 825 Sample Surveys</td>
<td>3</td>
</tr>
<tr>
<td>STT 850 Applied Multivariate Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>STT 861 Theory of Probability and Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>STT 862 Theory of Probability and Statistics II</td>
<td>3</td>
</tr>
<tr>
<td>STT 873 Statistical Learning and Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>EC 821A Cross Section and Panel Data Econometrics I</td>
<td>3</td>
</tr>
<tr>
<td>EC 821B Cross Section and Panel Data Econometrics II</td>
<td>3</td>
</tr>
</tbody>
</table>
CSE 331 Algorithms and Data Structures 3
CSE 480 Data Systems 3
CSE 482 Big Data Analysis 3
CSE 847 Machine Learning 3
CSE 881 Data Mining 3
ANS 814 Advanced Statistics for Biologists 3

**EPI 999 Dissertation Research (24 credits)**
A minimum of 24 dissertation research credits is required for graduation, and a maximum of 36 credits is allowed.

**Scientific Integrity (1 credit)**
Epi 828 Responsible Conduct of Research 1

**Scientific Integrity:** All Biostatistics PhD students must complete the entire set of MSU Graduate School workshops on Responsible Conduct of Research earning the Certificate of Completion (http://grad.msu.edu/rcr/), one credit of EPI 828, and, if the dissertation work requires MSU IRB approval, complete the necessary online MSU Institutional Review Board (IRB) training (http://www.humanresearch.msu.edu).

* **Biostatistics and Epidemiology Electives**
All core Biostatistics courses can be used as biostatistics electives. Any course in Epidemiology can be used as an elective.

**Independent Study Credits:**
Doctoral students may take independent study credits by making appropriate arrangements with a supervisory faculty member, completing the Application for Independent Study, and registering for EPI 990. A maximum of nine credits can be earned through independent study and credited as electives (Independent Study Form, Appendix A.1).

2. **Other Requirements and Opportunities for Profession Development**
The Biostatistics PhD program requires students to be resident as a full-time student for 2 consecutive semesters involving the completion of at least six credits of graduate work each semester. During this time the student is expected to be a full-time participant in the academic life of the department, the college, and the university, with attendance and engagement in research work, meetings, the department’s seminars, grand rounds, and other appropriate learning experiences pertinent to the content of the PhD student’s future research career. When in residence (i.e., full-time status—minimum of six credits-- for two consecutive semesters) all PhD students are required to participate in the Biostatistics Seminar series, and attend at least 80% of all presentations. There is a sign-in sheet at each seminar; and attendance report will be sent each semester to the student and their Adviser. Biostatistics PhD students are encouraged to seek out research collaborations and initiate research activities early in their graduate program.

3. **Academic Standards**

- The minimum overall grade-point average (GPA) required for graduation is 3.0.
- In any given semester, a 3.0 cumulative GPA and a grade of 3.0 in any core course must be achieved to continue enrollment.
- The achievement of a grade below 3.0 in more than two courses (core or elective) removes the student from candidacy for the degree.
• A student who fails to meet minimum standards will be reviewed by the Department’s Graduate Program Committee (GPC) before being permitted to re-enroll.

4. Transfer Credits and Course Equivalencies
For each of the following scenarios complete the Course Equivalence Form (Appendix A.2).

d. For students who received a masters degree in Biostatistics or Statistics*:
   • A maximum of 9 semester credits from graduate courses can be transferred toward the credit requirements for the PhD (Total credits: 51 PhD – 9 = 42 credits). These courses must match existing course options in the MSU program and be approved by 1) the Primary Advisor, 2) course instructors of the equivalent MSU Biostatistics courses, and 3) Department Graduate Program Director.

   *Students must obtain course equivalency approvals for all previous MS in Biostatistics/Statistics coursework to ensure courses taken as part of their previous degree are equivalent in content to the MSU MS in Biostatistics/Statistics core course requirements. Any non-equivalent courses will require enrollment in MSU Biostatistics/Statistics courses.

e. For students who have not received an advanced degree in Biostatistics/Statistics there are two admission options:
   • Option 1: Sequential MS and PhD degrees: Admission to the MS program, followed by later admission to the PhD after demonstration of Biostatistics skills.
   • Option 2: PhD only: Direct admission to the PhD program only occurs under special circumstances.

Option 1 (Sequential): After completing the required 40 credits of the MS program (see requirements for MS in Biostatistics/Statistics), the student can transfer 9 of these MS credits towards the PhD program, thereby reducing the required number of PhD credits from 51 to 42. Total credits required for sequential MS (40) and PhD (42) degrees = 82 credits.

If students completed graduate courses prior to enrolling in the graduate Biostatistics degree program, a maximum of 9 semester credits from these courses can be counted toward the MS, thereby reducing the required number of MS credits from 40 to 31. These courses must match existing course options in the MSU program and be approved by 1) the Primary Advisor, 2) course instructors of the equivalent MSU Biostatistics courses, and 3) Department Graduate Program Director (GPD). If such credits are successfully transferred, the total number of required credits for the sequential MS (31) and PhD (42) degrees = 73 credits.

Option 2 (PhD only): Under special circumstances students who do not have a graduate degree related to Biostatistics/Statistics can be admitted directly to the MSU PhD program in Biostatistics. Such students must complete all core-course requirements of the MS program (a total of 20 credits. One credit is for the Responsible Conduct of Research course which is a requirement for the PhD program in Biostatistics). These 20 MS credits will be added to the 50 credits required by the PhD, so the total credits required for the PhD-only program is 70.

Because PhD only students (no previous Masters degree in Biostatistics) do not author an MS thesis they will be required to submit, in lieu of this thesis, one of the following first-authored works in biostatistics or statistics: 1) a previous peer-reviewed publication; 2) a manuscript of publishable quality; or 3) a grant application judged likely to be funded. This work will be submitted to the Primary Advisor and the GPD prior to the PhD dissertation proposal defense.
5. Time Limits
Students have 8 years from the time of matriculation to complete the PhD program.

6. Student Progress
At the end of each semester, the student should update their coursework plan on the Course of Study Worksheet and timetable for completion of degree requirements. This plan should be approved by the Primary Advisor (Dissertation Advisor) and filed with the Graduate Secretary.

7. Primary Advisor, Dissertation Advisor, Dissertation Committee

A. Advisors
It is the responsibility of the student to schedule regular meetings with the Primary Advisor. Ordinarily, the Primary Advisor becomes the Dissertation Advisor and the Dissertation Committee Chair. Under some conditions it may be appropriate to arrange for a new Dissertation Advisor. This decision will be reviewed by the Department Graduate Program Committee and the new Dissertation Advisor will become the student’s Primary Advisor.

B. Dissertation Committee (Guidance Committee)
The Dissertation Advisor (Dissertation Committee Chair) is a tenure-stream Biostatistics faculty member in the Department of Epidemiology and Biostatistics. Any other MSU faculty member can serve as Committee Chair with the approval of the Department Chair, provided that he/she has been previously approved as a committee member by The Graduate School. Co-chairing is possible provided that one of the chair-persons is in the tenure-stream. The advisor will work with the student to select a Dissertation Committee that will consist of the Dissertation Advisor plus at least three additional tenure-stream faculty members, or any other MSU faculty members or outside members subject to The Graduate School approval. It is required that at least two of the committee members have expertise in biostatistics/statistics.* The number of non-regular faculty may not exceed the number of regular MSU faculty on the committee.

This Dissertation Committee should be selected as soon as possible after the Dissertation Advisor has been designated and the dissertation topic has been chosen. Optimally, the Dissertation Committee will be formed as soon as possible after successful completion of the comprehensive examination. Committee members will sign the Committee Membership Form.

*The Graduate School must approve all committee members. MSU tenure stream and tenured faculty are automatically approved as committee members. All others from inside or outside MSU can only be approved after the department Graduate Secretary obtains and submits a package of documents to The Graduate School. As this process can take considerable time, students are encouraged to obtain approval before committee activity is anticipated.

8. Written Comprehensive Examination

Expected Timeline
All PhD students (except as noted below) are required to take a written comprehensive examination at the beginning of the second year of the PhD program in Biostatistics for the core courses common to all three tracks. The examination is usually offered twice a year;
typically at the beginning of the fall and spring semesters. A student who fails the comprehensive examination may re-take the exam within one year after the first take.

Students who are admitted to the PhD program with no previous masters-level training in biostatistics/statistics, or who have not taken all of the required core courses by the end of the first year, may delay taking the examination until the beginning of the third year of study.

Any student who wishes to request an exception to the above timeline must file a written petition to the Graduate Program Committee (GPC). The petition should document the reasons for the intended delay and must include a specific timetable for completing the exam. The petition must be submitted to the GPC at least 4 months prior to the scheduled examination date. The GPC will have up to 4 weeks to either approve or deny the petition.

It is the responsibility of each student and his/her major advisor to plan the sequence of core and elective courses so that the student is in the best position to succeed at the examination. The Graduate Program Director (GPD) is available to answer questions and address any concerns.

**Review of Examination Results**

All students are strongly encouraged to review their graded examination. This review can be accomplished by contacting the Graduate Secretary (GS), who will coordinate a meeting between the student, advisor and GPD, if one is indicated.

**Rules for Scheduling Examinations**

Students who are scheduled to take the examination but withdraw before or on the date of the exam will forfeit one of their two opportunities to take the examination (and so, in effect, will fail that examination). Students who miss the examination due to an unanticipated illness (or other non-medical problem) will be required to submit a medical letter (or equivalent documentation for a non-medical problem) to the GPC as soon as possible, and will be expected to take the exam on an agreed upon re-take day (typically the following week).

Students who fail to pass either or both the Epidemiology and biostatistics sections of the examination on the first attempt are expected to re-take the failed section(s) the next time the examination is offered. Any student who wishes to request an exception to this requirement must file a written petition to the GPC at least 4 months prior to the next scheduled examination. The petition should document the reasons for the intended delay and must include a specific timetable for completing the exam. The GPC will have up to 4 weeks to either approve or deny the petition.

Students who exhaust their two chances to take the examination without achieving a passing grade will be reviewed by the GPC, who will make a recommendation to the faculty that may involve dismissal from the PhD program.

9. PhD Dissertation Requirements

**A. PhD Dissertation Content/Format**

The purpose of the PhD dissertation is to apply biostatistics training to a health issue and make a substantive contribution to the field. Two formats are acceptable for a PhD Biostatistics dissertation project. The PhD dissertation project should be substantial
enough after suitable peer review to: 1) yield three publishable scientific articles, or 2) be publishable as a full-length monograph by a university publishing house or other approved publishers. Students are encouraged to elect the first option to expedite publication in peer-reviewed journals.

The dissertation itself will follow standards of the field, according to the specifications of the dissertation committee. One standard model includes: 1) a chapter describing the potential scientific and public health significance of the research on the selected topic or topics, as well as the hypotheses, research questions, or specific aims of the project, 2) a careful and thorough scholarly review of pertinent theory and literature that serve as background for the project, 3) a methodology chapter that explains the research approach in detail, including pertinent statistical methods, 4) three publishable chapters where the study results are presented (e.g., one for each publishable scientific article), and 5) a final discussion/conclusion chapter that summarizes the main facets of new evidence, reviews limitations, places the results into context with past theory and evidence, outlines directions for future research and provides an overview summary, including implications with respect to theory, new research, and (when pertinent) public health practice.

B. Dissertation Proposal

Following successful completion of the comprehensive examination, each PhD student must prepare a Thesis/Dissertation Proposal Form, as well as a dissertation proposal as described in this section. The dissertation research project described in the proposal must constitute hypothesis-based original research in Biostatistics and public health of sufficient quality and depth to warrant publication after peer review.

The Dissertation Proposal should contain: 1) a description of the proposed topic; 2) hypotheses or research questions and specific aims; 3) the scientific and public health significance of the proposed research; 4) a review of theory, prior evidence, and research issues pertinent to the topic; 5) the study design, methods, and analyses required for completion; and 6) a bibliography with a list of citations and resources consulted. This Dissertation Proposal is to be developed in preparation for the PhD candidate’s independent research, which is to be mentored and guided primarily by the Dissertation Advisor, with the assistance of the Dissertation Committee. The dissertation proposal will become an element in the student’s progress report as filed with the department.

C. Oral Presentation of the Dissertation Proposal

1. After passing the comprehensive examination students must schedule a meeting of the Dissertation Committee at which time: 1) students will give an oral presentation of the dissertation proposal; and 2) students will provide a list of courses completed. Students should submit their written dissertation proposal to the Dissertation Committee at least two weeks before the oral presentation. At this Dissertation Committee meeting students will receive input on merits of the dissertation proposal, potential modifications, and additional courses that may be needed to successfully complete the dissertation. The student and Dissertation Advisor are encouraged to invite at least one faculty member from the Department of Epidemiology who is not serving on the Dissertation Committee to be present and provide additional feedback at the oral presentation of the dissertation proposal.

2. Following the Dissertation Proposal Presentation, two forms must be completed by the student and the Dissertation Committee: 1) The Thesis/Dissertation Proposal; and 2) Report of the Dissertation Committee listing all degree requirements. Both forms should be submitted to the Graduate Secretary.
3. Students can receive no more than 6 dissertation credits (EPI 999) for dissertation proposal development before the Dissertation Proposal has obtained final committee approval.

D. Human Subjects Protection for PhD Dissertation

When applicable the thesis proposal should be submitted for approval to the MSU Human Research Protection Program (http://www.humanresearch.msu.edu) or the corresponding animal safety committee, when the research requires use of data from or contact with human participants or animal subjects. In some instances, students working on data from an ongoing research project with Institutional Review Board (IRB) approval will be asked to apply to the IRB as a secondary investigator. It is a program requirement that the MS student undertaking human subjects research must complete MSU’s tutorials (e.g., the online IRB tutorial and examination). Copies of the certificate from the IRB tutorial should be filed with the Graduate Secretary and the Thesis Advisor.

E. Dissertation Defense

6. Students must be enrolled for at least one credit in any course, or for dissertation credits, at the time of their defense.

7. Committee members must sign the Approval to Defend Form.

8. Dissertation Sign-off Forms: Students should obtain the sign-off form (Thesis/Dissertation Defense Form) from the Graduate Secretary and hand it to the Dissertation Committee Chair (Dissertation Advisor).

9. It is an MSU policy that all dissertation defenses are open to the public and all Biostatistics faculty and students are invited and encouraged to attend. In addition, the student and Dissertation Advisor shall appoint one faculty member from the Department of Epidemiology and Biostatistics, who are not a dissertation committee member, to serve as an observer at the defense. The observer shall be identified at the time the defense is scheduled. The observer is invited to read the dissertation prior to the defense. The role of the observer is to observe the presentation, be present during closed door deliberations, and contribute as s/he sees fit. The observer will have no vote. The dissertation should be scheduled so that the observer can attend to provide additional feedback.

10. Each final Dissertation defense is scheduled to last approximately two hours and progress through the following stages: 1) Introduction of committee members; 2) Student oral presentation (30-60 minutes); 3) A question/answer session that is open to the public; 4) A question/answer session with student and committee members only; 5) A private deliberation by committee members without the student present, in which committee members vote on the Dissertation defense outcome; and 6) A reuniting of the student and committee members at which time the student is informed of the committee decision. This may include revisions before final acceptance of the Dissertation.

F. Dissertation Evaluation and Final Acceptance

One of the following outcomes is assigned by the committee after the defense:

- Acceptable as is
- Acceptable with minor revisions
- Acceptable with major revisions
• Unacceptable

The first three outcomes constitute passing grades. Any revisions students need to incorporate should be communicated in writing by committee members, or if provided orally during the defense, should be recorded by the student. A procedure and timeline for evaluating whether the revisions are acceptable should then be determined. The committee may turn this evaluation task over to the Dissertation Chair, or may delegate the authority to another committee member or members.

10. PhD Student Timeline

1. Initiate meeting with Primary Advisor to discuss coursework plan and dissertation research interests.
2. Begin coursework.
3. Take the written comprehensive examination within the first year of the PhD program. Students may petition for an exception.
4. The Dissertation Committee (see section 7.B) should be formed after successful completion of the comprehensive examination.
5. After forming the dissertation committee, prepare a written dissertation proposal.
6. Present the dissertation proposal to the Dissertation Committee. This presentation is open to the public. Complete and submit the two required forms.
7. Obtain IRB approval.
8. Pursue the research described in the dissertation proposal and complete any additional coursework as needed.
9. Meet with the Dissertation Advisor and with the Dissertation Committee as needed.
10. Submit a draft of the complete dissertation to the Dissertation Committee at least three weeks before the final dissertation defense date. The student should check with the Dissertation Advisor and committee members because they may require more time to review the dissertation.
11. Students must notify the Graduate Secretary at least two weeks before the dissertation defense to allow for scheduling and publicizing of the defense.
12. Students must be enrolled for at least one credit during the semester of their final defense.
13. Defend the dissertation; the protocol for the defense is described above. The final dissertation defense is open to the public.
14. Following the dissertation defense, if revisions in the written dissertation are indicated, it is recommended, though not required, that revisions be completed within the same semester. Students will not receive their PhD degree until revisions are completed, the Dissertation Committee Chair has signed off, and the dissertation has been submitted to the Graduate School. (After December 17, 2010, only electronic dissertation submissions will be accepted). The IRB project approval letter must be submitted with the final dissertation document to the graduate school. Students do not need to be enrolled when completing revisions or applying for graduation. Remember that all aspects of the PhD Program must be completed within the eight year time frame.
V. DISSERTATION/THESIS SUBMISSION REQUIREMENTS

These requirements apply to both MS and PhD students.

1. University Committee on Research Involving Human/Animal Subjects (IRB)

A. Research Involving Human Subjects

The review process begins when an investigator submits a complete application to the University Committee on Research Involving Human Subjects (UCRIHS) office. UCRIHS assigns the application an IRB log number. Depending upon the level of risk to subjects in the protocol, UCRIHS assigns the protocol to one of three review categories (exempt from full review, expedited review, full review) and sends it to one, two, or five reviewers, respectively. If the reviewer is satisfied that the rights and welfare of the human subjects are adequately protected, he or she approves it. However, if the reviewer has concerns, the reviewer returns written comments to the UCRIHS office for transmission to the investigator. The investigator must then send a response to each comment, in writing, to UCRIHS, which will forward it to the reviewer(s). If the proposal is either an exempt or expedited proposal, an approval letter can be issued as soon as the reviewer approves. When a proposal receives full (five-member sub-committee) review, an approval letter is issued after the proposal is discussed and approved by vote of the full committee at its monthly meeting.

B. Research Involving Animal Subjects

The use of vertebrate animals in research, teaching, and outreach activities is subject to state and federal laws and guidelines. University policy specifies that: all vertebrate animals under University care (that is, involved in projects under the aegis or sponsorship of the University) will be treated humanely; prior to their inception, all vertebrate animal projects receive approval by the All University Committee on Animal Use and Care (AUCAUC); Michigan State University (MSU) will comply with state and federal regulations regarding vertebrate animal use and care.

MSU policy requires that every project involving living vertebrates be reviewed for appropriateness by the AUCAUC before the use of these animals begins.

Principal investigators or project directors must obtain approval from the AUCAUC before initiating any research, testing, or institutional project involving the use of vertebrate animals. Graduate students whose theses or dissertations include research involving vertebrate animals must provide the Graduate School with the approval number and a copy of the AUCAUC approval letter.

If a principal investigator or project director believes that a particular animal project does not need to be reviewed, he/she should contact the secretary of the AUCAUC. There are several AUCAUC policies related to exclusion. Graduate students should request a letter from the AUCAUC that indicates approval of the exclusion, which can be presented to the Graduate School along with the thesis.

For the complete policy, please see the MSU Faculty Handbook, or contact the office of the Vice President for Research and Graduate Studies in 226 Administration Building, 355-0306.
2. Submission of Dissertation/Thesis

The format of the dissertation/thesis must be in accordance with “The Graduate School Guide to the Preparation of MS Theses and Doctoral Dissertations.” The formatting guide can be obtained from the Graduate School, 466 West Circle, Chittenden Hall, 353-3220. After December 17, 2010, only electronic dissertation submissions will be accepted by the Graduate School. However, Epidemiology continues to require at least one print copy for the department. Students can also access the guide via the Graduate School home page: http://grad.msu.edu/etd/. The student must submit to the Graduate School one separate copy of the abstract when submitting the dissertation/thesis.

3. Required Copies of Dissertation/Thesis

One unbound dissertation/thesis is to be submitted to The Graduate School, 466 West Circle, Chittenden Hall. Students are required to submit a bound dissertation/thesis to the department, and members of the Dissertation/Thesis Committee may also require bound copies. The Graduate School maintains a list of previously used binderies.


Electronic versions of all dissertations/theses will be kept by the MSU Library and by ProQuest. These electronic versions are considered by the University to be a form of publication, but does not preclude printing the thesis in whole or in part as a journal article or monograph.

VI. PROCEDURES FOR GRADUATION (UNIVERSITY AND DEPARTMENTAL)

1. Approval for Graduation

The student must have completed all requirements for the degree. The Graduate Secretary will verify that all requirements have been met.

2. Application for Graduation

An Application for Graduation can be found through the Registrar’s Office online. It should be submitted at the beginning of the semester in which the degree is to be awarded.

VII. ACADEMIC HEARING PROCEDURES FOR GRADUATE STUDENTS DEPARTMENT OF EPIDEMIOLOGY AND BIOSTATISTICS COLLEGE OF HUMAN MEDICINE

Please see the following link: http://www.epi.msu.edu/academics/epibio_grievances.pdf