GUIDELINES AND PROCEDURES
FOR
MASTER OF SCIENCE THESIS

Preamble

The Master of Science degree at the University of Michigan is administered by the Rackham School of Graduate Studies. In the Department of Environmental Health Sciences, students registering for the Master of Science degree are required to undertake a program of didactic coursework (subject matter and amount depending on the area of specialty, both of which lie outside the scope of this paper), together with original research culminating in a masters thesis.

Definition and scope of the research

Upon enrollment, each student will be assigned an Academic Advisor. The student will work with his/her academic advisor to identify a Research Advisor with interests compatible with their own, and who will work with them to develop a research project that falls within the area of the defined specialty. The research will take the form of an original investigation leading to an outcome that reflects new knowledge in the area in question, having the potential for publication in the peer-reviewed literature. The work itself may take any of the following forms:-

- A laboratory study, yielding experimental data that will be analyzed and interpreted in terms of new or existing mechanisms and/or natural scientific models.
- A field study, yielding experimental data that will be analyzed and interpreted in terms of new or existing natural scientific models.
- A survey of opinions of individuals, or groups of individuals, yielding empirical data that will be analyzed and interpreted in terms of new or existing social scientific models.
- A study of the behaviors of individuals, or groups of individuals, similarly yielding empirical data that will be analyzed in terms of new of existing social scientific models.
- A paper study of previous work that integrates existing knowledge, re-analyzes existing data, and adds new knowledge.

or any combination of these. In any of one of the above, analysis may involve any combination of statistics, mathematics or other scientific procedure aimed at elucidating the subject of the enquiry, while interpretation may involve any philosophical or intellectual process aimed at making a clear articulation of what new knowledge has been gained. Individual specialty areas may specify a particular combination of the research options listed.

The scale – in terms of a combination of amount and depth – of the research undertaken should be equivalent to that described by a good intra-agency or corporate technical report, or commensurate with the work required to produce a single peer-reviewed publication.[1] So it is likely to be quite narrowly focused. This is to be compared to the expectation – typically equivalent to three or more peer-reviewed publications – for doctoral level research, which reflects significantly greater amount, depth and (usually) breadth.

Research committee

[1] Note, however, that a peer-reviewed publication, while desirable, it is *not* a *requirement*.

For each student, a Committee will be appointed to aid in supervision of the research, assisting in its setting up, execution and completion. It will comprised three faculty members, including a Research Advisor from the Department of Environmental Health Sciences, another faculty member of the same Department and one other (Cognate) from another department which may or may not be in the School of Public Health. The Research Advisor will be appointed as soon as possible after the student has enrolled (with the assistance of the appointed academic advisor), after he/she has had the opportunity to explore options (including areas of potential matching interest, resources, etc.) that might be available. The student will then work with the Research Advisor to identify the other two committee members (based on considerations of matching or complementary interests), so that the Committee will be appointed as early as possible during preparation of the research Proposal (see below) and it is submitted.

Research proposal

The Proposal will take the form of a written document that includes:-

- Introduction and statement of the problem to be studied.
- Objectives of the research and articulation of its hypothesis.
- Background summary.
- Identification of methods to be used and type of results to be expected.
- Summary of analytical methods or modeling procedures to be applied.
- Identification of expected outcomes.
- Summary of IRB and other special procedures to be followed.
- Identification of resources needed and indication of how these will be realized.
- Outline of tasks and time-line of execution.

This will presented to the Committee for comments, suggestions for improvements and –ultimately – approval. The Committee will evaluate the Proposal in terms of:-

- Content, breadth, depth and scope commensurate with graduate work in the environmental health sciences at the master's level.
- Clarity of aims and objectives.
- Quality of the background learning by the student as reflected in the document.
- Study design.
- Feasibility of the research itself and its relevance to environmental health.
- Availability of the resources in order to allow successful execution of the research.

Any gaps that remain will be identified by the Committee and conveyed to the student. When the Committee is satisfied that the proposed research meets the defined standards according to these criteria, approval will be given for the research to proceed.

After formally approval, the work may begin. It is expected that completion of the proposal and its approval will take place before the end of the first Winter Term of the student's enrollment.

Conduct of the research

The time-line for the research may be flexible. But guidelines are offered towards helping the student manage the effort required to initiate and complete the research, and write the thesis, in time for graduation at the end of the second academic year after enrollment. It is suggested that the main body of the research should be carried out during the Summer following the end of the first Winter Term, and should continued into the second year of the student's enrollment. The experimental, field or other data-gathering part of the work should be completed by early in the following (second) Winter Term, and work should begin on analysis and interpretation of the results, followed by preparation of the Thesis, to be completed before the end of the (second) Winter Term. In preparation of the Thesis, the student will work mainly with his/her research advisor. The completed Thesis will be submitted to the Committee, who will

then convene – with the student – for a private oral presentation and question-and-answer session. The research requirement of the Master of Science degree will be considered to be complete upon approval of the Thesis by the Committee.

Evaluation of the student's progress in their research will be monitored continuously by the Research Advisor, with input from Committee members as appropriate.

Masters thesis

The Thesis will be a document written by the student that may contain the following:-

- Abstract
- Introduction, including preamble and identification of the problem, articulation of the primary and secondary objectives of the work, and statement of the hypothesis to be addressed.
- Background, including a review of relevant literature, and identification of gaps in knowledge.
- Approach and methods to be adopted.
- Presentation of the results.
- Discussion of the results, including description of analyses of raw data to reveal important effects, trends or tendencies.
- Conclusions and implications of the research.
- Acknowledgements to individuals or supporting parties.
- List of references.

With the approval of the Research Advisor and Committee, the same information may be presented in any format considered to be customary or acceptable in the description of scientific enquiry.

The Thesis will be presented to the Committee in an appropriate closed format (face-to-face meeting or some form of electronic communication), and the Committee will examine the work in all its aspects in a question-and-answer forum. The Thesis will be evaluated in terms of:-

- Content, breadth, depth and scope commensurate with graduate work in the environmental health sciences at the masters' level.
- Clarity of aims and objectives.
- Quality of the background learning by the student as reflected in the document.
- Study design
- Execution of the research and the clarity of its exposition.
- Quality of the data.
- Style and quality of the analysis and interpretation.
- Lucidity of the discussion and conclusions.
- Identification and expression of any importance of the results to environmental health.
- Responses of the student to questions posed by the Committee.

The Committee will discuss the Thesis, and the overall effort on the part of the student, and will arrive at a consensus on one of the following:-

- Satisfactory overall performance, approve with no further work needed.
- Generally satisfactory performance but some minor work needed on the Thesis.
- Generally satisfactory work, but some major work needed on the Thesis.
- Unsatisfactory, so the student needs to do more work in order to complete the thesis requirement.

The Committee will prepare a written summation of its evaluation according to these guidelines.

Time-line

As mentioned above, it is desirable that the research should be completed by the end of the Winter Term of the student's second year, in order that the student may graduate on schedule. However, delays may occur in some cases due to circumstances beyond the control of the student. In such cases, final completion may take place within one year of the end of the student's second year of enrollment (end of Winter Term of the third year). Extensions beyond that shall be considered exceptional and will be allowed only upon petition to, and approval by, the Chair of EHS, and consistent with any overarching rules or requirements of the Rackham School of Graduate Studies.