

Northeastern ILLINOIS UNIVERSITY

NIH MARC U-STAR PROGRAM

MARC U-STAR SCHOLAR MANUAL for RESEARCH THESIS

NIH Maximizing Access to Research Careers (MARC) U-STAR Program

BBH-204D; (773)442-5716; <http://www.neiu.edu/marc>



Northeastern ILLINOIS UNIVERSITY

NIH MARC U-STAR PROGRAM

NIH-MARC U-STAR Project Manual for Research-Based Thesis

The MARC U-STAR (MAXIMIZING ACCESS TO RESEARCH CAREERS) manual will provide information for MARC Scholars about how to prepare and complete their senior MARC thesis. The Scholar's responsibilities, timeline for completion, and requirements for content and format will be outlined in this manual.

The requirements in this manual are only for those who do not have a discipline specific format to use (e.g., for Psychology, APA is the format of choice). If your discipline has a specific format—this specific format can be applied to your thesis.

Important note for all MARC Faculty Mentors: It is the responsibility of the MARC Scholar to be aware of the MARC thesis requirements and to ensure that their Faculty Mentor has a copy of this manual. Please address any questions about this manual to all of the MARC Program Directors:

- ❖ Dr. Ruth B. Church (rbchurch@neiu.edu), Department of Psychology
- ❖ Dr. Emina A. Stojković (e-stojkovic@neiu.edu), Department of Biology
- ❖ Dr. Joseph E. Hibdon, Jr. (j-hibdonjr@neiu.edu), Department of Mathematics

A thesis must be written and approved by Program Directors & MARC Mentor prior to graduation.

NIH MARC U-STAR Research Thesis:

Table of Contents

PART I. THE MARC THESIS PROJECT

| | |
|---|---|
| ABOUT THIS MANUAL | 1 |
| PLANNING FOR MARC THESIS | 3 |
| MARC RESEARCH SKILLS I COURSE OVERVIEW | 4 |
| MARC RESEARCH SKILLS II COURSE OVERVIEW | |

PART II. MARC THESIS PROJECT CRITERIA

| | |
|--------------------------------------|---|
| CONTENT CRITERIA FOR RESEARCH THESIS | 5 |
| PROJECT PROPOSAL | 6 |
| GENERAL NOTES ON THE PAPER | 7 |
| ACADEMIC INTEGRITY | |

PART III. TIMELINE

| | |
|--|----|
| TIMELINE FOR COMPLETION | 8 |
| APPENDICES | |
| Appendix A: MARC TRAINEE CURRICULUM | 9 |
| Appendix B: RESEARCH TOPIC | 10 |
| Appendix C: ACCEPTANCE AND APPROVAL PAGE | 11 |

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NIH MARC U-STAR PROGRAM

MARC U-STAR SCHOLAR: Part I

Part I: Planning for your MARC Thesis

Once you have reached your **Junior** year you should be doing research with your MARC mentor and letting the Program Coordinator/Assistant know about your topic (see Appendix A). Also, at this time you will be enrolled into the **Research Skills I** course (Fall Semester), followed by the **Research Skills II** course (Spring Semester; see Appendix B).

In your **Senior** year, you should make an appointment with both your Program Directors *and* PI to discuss your thesis topic based on your research. After this discussion, please complete the Research Topic/Contract Form (see Appendix A).

| Intramural Summer Research Training Experience | | | | |
|--|--------------------------|---|---------------------------|---|
| Year 3 | BIO 303 - Genetics | 4 | BIO 340 - Molecular BIO | 4 |
| | BIO 362 - Biochemistry | 4 | Research Skills II | 3 |
| | Research Skills I | 3 | General Education | 9 |
| | Physics 207 | 4 | | |

Note: If your research topic changes you *must* fill out a new Research Topic Form and inform the MARC Program Director Dr. R. B. Church.

Part I: What you will accomplish in Research Skills I?

The first course in the research skills series will provide an introduction to topics at the forefront of research in the sciences. It is designed to give students the background and skills they need to conduct a research project. Students will also be instructed in the responsible conduct of research, and the IRB and/or IACUC process.

Upon completing this course, you will be able to find sources, write a literature review, and prepare presentations for academic conferences (i.e. SCSE research symposium, SCANAS, etc.). In addition, you will be prepared to write the introduction section of an academic paper and have the skills to find sources needed for research with your mentor and in other contexts.

Note: All students are expected to be actively involved in a research project under the supervision of a faculty member in the Biology, Chemistry, Computer Science, Mathematics, Physics, or Psychology department. Students will periodically be asked to discuss progress on research projects in class. All students will be required to give a formal presentation of their research project methodology and, if appropriate, their results.

Part I: What you will accomplish in Research Skills II?

In the second course of the research skills series, student instruction emphasizes quantitative analysis and interpretation of research articles. The course is structured around a series of modules, each covering a topic in Biology and/or Mathematics. The modules are self-contained, but also draw connections between scientific disciplines and explore their inter-relationships. The modules vary depending on the assigned faculty to teach this course.

In this class students:

- Interpret and describe research results
- Develop quantitative analytical skills
- Explore connections between Mathematics and Biology, and their inter-relationship
- Write reports and present their work in an oral presentation
- Analyze mathematical models of physical phenomenon using simple numerical techniques

Note: All students are expected to be actively involved in a research project under the supervision of their MARC mentor. Students will periodically be asked to discuss progress on research projects in class. All students will be required to give a formal presentation of their research project methodology and, if appropriate, their results at the Annual Research and Creative Activities Symposium at NEIU during the Spring symposium.

MARC U-STAR SCHOLAR: Part II

Part II: General Criteria for MARC Research Thesis Project

While the structure of a MARC research thesis project will vary according to academic discipline, the following elements are required for any well-organized study:

Main Purpose: Students will have a clear main point/thesis that explains your research question and its relevance/significance to a broader academic field.

Synthesize Past Research: Students will synthesize and interpret past research in their academic field. Students will show their ability to synthesize and interpret by completing the literature review section of their paper. This part of your paper will demonstrate your analytical skills.

Research Question/Hypothesis: Students will clearly state their question(s) or hypothesis(es) about their main purpose of their chosen topic. Students will show their ability to interpret and describe their main interest in their research.

Goal of MARC Research Thesis Project: Students MARC research project will show their ability to write an academic paper that will contribute to their academic field.

Note: This paper must be the students own original contribution to the larger study. This thesis project may overlap with other thesis projects as long as it is approved by MARC Faculty Mentor and Program Directors. Please indicate that on the **research topic/contract form** (see Appendix A).

Part II: General Notes on the thesis Proposal

Thesis Proposals will consist of the following:

- A. Title Page (includes title of project, MARC students name, MARC Faculty Advisors name, and Northeastern Illinois University)
- B. Abstract (150-250 words)
 - (1) Stating the general research problem
 - (2) Stating the specific research question or hypothesis
 - (3) 1-2 sentences stating the experimental design, # of participants/subjects, age of participants/subjects and procedure
 - (4) Stating why the research is important (what gap does it fill in the current research)
- C. Literature Review (2-3 pages)
 - A discussion of background theory & literature that motivates the proposed research.
 - Should end with a general statement of the research question or hypothesis that is stated in general terms
- D. Methods (1-3 pages)
 - Describe in detail the experimental design & methods used to answer the research question/ hypothesis
- E. Results/Analyses Section (1-2 pages)
 - Describe the independent variables including their levels and measurement (if applicable), the dependent variables including operational definitions, and scale of measurement (nominal, ordinal, interval, or ratio), statistical procedures and hypotheses.
- F. Discussion (Significance) Section (1 paragraph, which is 3-5 sentences)
 - Includes at least one of the following three elements that shows how your study adds to the literature and the field (and as many that are relevant):
 - (1) What do your results mean
 - (2) How the results will compare with other research findings
 - (3) Practical and/or theoretical implications
 - (4) Whether the results will test a particular theory

Note: Each proposal will vary based on the students discipline and there is not a minimum length for the proposal. The main purpose of this proposal is to showcase the student's research content to their Program Directors and MARC Faculty Mentor. This should be completed after the **research topic/contract** (see Appendix A) is submitted and approved before final paper is completed.

Part II: General Notes on the Paper

Format: Students final MARC thesis will largely follow your academic protocol of your field. With the help of their MARC Faculty Mentor, agree on the academic style that is most relevant to their field of study (e.g. APA, Chicago, MLA, etc.), and adhere to that style consistently throughout your project. Please include the following with your paper acceptance and approval page, title page, and abstract.

Margins and Spacing: Follow the guidelines of the academic style for your paper. For example, APA style requires that you use a one-inch margin all around the paper and requires a header.

Tables/Figures: Follow the guidelines of your academic style.

Length: Students' final MARC thesis paper will largely follow their academic protocol of their field. With the help of their MARC Faculty Mentor, you should complete a paper that has a minimum of 15 pages.

Part II: Academic Integrity

By completing this thesis each student is bound by the NEIU Student Code of Conduct: <http://www.neiu.edu/university-life/student-rights-and-responsibilities/student-code-conduct>. Students whose work is found to be plagiarized in any way will be expelled from the program.

MARC U-STAR SCHOLAR: Part III

Part III: Timeline for Completion

It is the responsibility of the students to draft, revise, and finalize their proposal and thesis. The foundation of learning how to complete this MARC thesis project will come from your Research Skills courses. The following steps of the timeline are to be completed. Any questions about this timeline please contact your MARC Faculty Mentor/ Program Director Dr. R. B. Church.

After the Research Skills I course:

- Start looking at resources for you research topic
- Start preparing for a literature review for your proposal
- Prepare presentations for academic conferences (i.e. SCSE research symposium, SCANAS, etc.)
- Complete the Research Topic/Contract Form

After the Research Skills II course:

- Complete Proposal for thesis paper (see page 6 for details):
 - A. Title Page (includes Title of Project, Name of MARC Scholar Name, Name of MARC Faculty Advisor(s), and Northeastern Illinois University
 - B. Abstract (150-250 words)
 - C. Literature Review
 - D. Methods
 - E. Results Analyses Section
 - F. Significant Section
- Write reports and present their work in an oral presentation.
- Analyze mathematical models of physical phenomenon using simple numerical techniques

Before Graduation:

- Complete Thesis Project/Paper:
 - This paper must be the students own original contribution to the larger study. This thesis project may overlap with other thesis projects as long as it is approved by MARC Faculty Mentor and Program Directors. Please indicate that on the **research topic** form (see Appendix A).

Appendix A: RESEARCH TOPIC/ CONTRACT

Please complete the following form and return it to MARC staff in **BBH-204D**.

Name: _____ NEIU ID#: _____
*N-mail address: _____ Phone number: _____
Current GPA: _____ Credit Hrs. completed by _____:
Insert Date
Classification: JR SR Research Lab Room #: _____

Please describe below your research topic (250 word count):

The MARC scholar and faculty mentor have reviewed and approve this research topic.

Student's Signature: _____ **Date:** _____

PI's signature: _____ **Date:** _____

Appendix B: MARC TRAINEE CURRICULUM

| Year | Fall | | Spring | |
|--|---|-------|--|-------|
| | Course | Units | Course | Units |
| Year 1 | BIO 201 | 4 | BIO 202 | 4 |
| | CHEM 211 | 5 | CHEM 212 | 4 |
| | MATH 187 – Calculus I | 4 | MATH 202 – Calculus II | 4 |
| | BIO 150 | 2 | First Year Experience | 3 |
| Year 2 | BIO 301 - Cell Biology | 4 | BIO 305 - Ecology | 4 |
| | CHEM 231 -Organic I | 4 | CHEM 232 - Organic II | 4 |
| | ENGL 101 | 3 | PHYS 206 | 4 |
| | MATH 275 – Applied and Computational Statistics | 3 | MATH 374 – & Simulation in Complex Systems | 4 |
| Intramural Summer Research Training Experience | | | | |
| Year 3 | BIO 303 - Genetics | 4 | BIO 340 - Molecular BIO | 4 |
| | BIO 362 - Biochemistry | 4 | Research Skills II | 3 |
| | Research Skills I | 3 | General Education | 9 |
| | Physics 207 | 4 | | |
| MARC Extramural Summer Research Training Experience | | | | |
| Year 4 | MATH 370 – Modeling in the Natural Sciences | 4 | Upper level math modeling course | 3 |
| | Honors Thesis Prep | 3 | Honors Thesis Presentation | 3 |
| | General Education | 9 | General Education | 9 |

Appendix C: ACCPTANCE AND APPRROVAL PAGE

MARC THESIS PROJECT ACCEPTANCE AND APPROVAL FORM

Student Name: _____

Complete Title of Thesis: _____

This MARC Senior thesis has been reviewed by the MARC Faculty Mentor and the Program Directors of the NEIU MARC U-STAR program.

MARC Faculty Mentor Date: _____

Dr. Ruth B. Church Department of Psychology, MARC Director Date: _____

Dr. Emina A. Stojković Department of Biology, MARC Director Date: _____

Dr. Joseph E. Hibdon Jr. Department of Mathematics, MARC Director Date: _____