



## Starting Your Undergraduate Honors Thesis In Industrial Engineering

### **ASU Industrial Engineering Honors Thesis:**

ABET requires that the accredited program include a capstone design project for all graduating seniors. In response to this requirement, honor students must incorporate an engineering design component into their senior honor thesis. This component could be a faculty sponsored design project accepted for a thesis, or it could be a pure research report which has some direct impact on design. The research report does not have to be a pure design project report, but it needs to demonstrate a relationship between engineering and design or engineering and design methods.

### **Summary of Steps:**

1. Think About a Research Topic or Area
2. Select a Faculty Advisor
3. Select Report Contents
4. Agree on Research Scope
5. Enroll in IEE 492 Honors Directed Study and IEE 493 Honors Thesis
6. Make a Schedule
7. Progress Through Your Research
8. Finish the Process

### **Step Details:**

#### **1. Think About a Research Topic or Area:**

Think about what you like and identify specific areas of interest. Consider engineering topics that you have not studied in depth and explore research areas through various journal articles. Visit with faculty members, your associate chair (Dr. Moor), or your academic advisor (Susan Borgers) for ideas on possible research topics.

#### **2. Select a Faculty Advisor:**

Visit with a faculty member who is currently studying a research topic that interests you and is someone with whom you feel comfortable working. Once you select a faculty advisor, you can expect to spend a great deal of time working on your thesis. So, you need to be committed to your research topic and to working with your faculty advisor on a regular basis. If you still need help identifying a thesis faculty advisor, please discuss your options with your associate chair for undergraduate studies (Dr. Moor) or your academic advisor (Susan Borgers). They can give you an overview of faculty research interests and make suggestions based on your research interests.

#### **3. Select Report Contents:**

You and your faculty advisor should agree on the form and depth of the report and other deliverables. Based on the specific topic of the thesis, different report outlines may be

appropriate. Three sample outlines that you and your faculty advisor may select/modify to meet the needs of the project have been included. Note: Students must adhere to the style guide provided by the Honors College.

**4. Agree on Research Scope:**

You and your faculty advisor will need to discuss and agree on the scope of the research/design problem. This may change over the course of the project, but the discussion provides a starting point for both you and your faculty advisor. It is a good idea to document agreements made between you and your faculty advisor to eliminate any miscommunication.

**5. Enroll in IEE 492 Honors Directed Study and IEE 493 Honors Thesis:**

If you decide to complete a three (3) credit hour thesis, you will need to enroll in IEE 493 (Honors Thesis). However, most thesis research projects expand beyond three hours and typically include IEE 492 (Honors Directed Study). Between IEE 492 and IEE 493, students will earn six (6) credit hours toward their thesis. IEE 492 can be used as a 3-hour technical elective for the Industrial Engineering curriculum and is generally taken one semester prior to IEE 493. While enrolled in IEE 492, you will develop a solid literature review and research proposal, and initiate the research. While enrolled in IEE 493, you will complete your research, complete writing your honors thesis, and defend your thesis.

**6. Make a Schedule:**

It is important for you to create a “working thesis” schedule with your faculty advisor that identifies deadlines for your research and deadlines identified by the Honors College. The Honors College has specific dates for receiving a thesis prospectus, performing the oral defense (e.g. November 16, 2005 or April 14 2006), and submitting the final document (e.g. December 2, 2005, or April 28, 2006). Ideally, you should create a Gantt chart enumerating all milestones.

**7. Progress Through Your Research:**

Start your research and meet with your faculty advisor on a regular basis (preferably once a week). Start early and finish early so that you can produce a good thesis and have time for revisions. You can expect to revise your thesis several times.

**8. Finish the Process:**

The thesis process culminates with an oral defense. The oral defense is your opportunity to meet with a selected committee and present your research project. You will explain your study to the committee and answer questions from the committee members. After the defense, some revisions to your report may be required before the final document is submitted to the Honors College.

**Sample Outlines:**

**1. Possible Research Thesis Table of Contents:**

1. Purpose and Organization
  - Purpose of the Study
  - Hypotheses or Research Questions

- Scope of the study
- Limitations
- Definition of Terms
- Organization of the Paper
- 2. Review of Related Research  
(Prepare an organized review of related and relevant research, indicating how the research will make a contribution).
- 3. Data Collection and Analysis
  - Methods Used to Collect Data
  - Methods Used to Analyze Data
  - Validation or Pretesting Procedures
- 4. Analysis and Presentation of Results of the First Research Question
- .
- .
- .
- .
- N Analysis and Presentation of Results of the Nth Research Question
- N+1 Overall Discussion of Results
- N+2 Conclusions
- N+3 Suggestions for Further Research

**2. Possible Design Report (as Honors Thesis) Table of Contents:**

- 1. Purpose and Organization
  - Purpose of the Study
  - Design Problem
  - Scope of the study
  - Limitations
  - Definition of Terms
  - Organization of the Paper
- 2. Review of Background Research  
(Prepare an organized review of related and relevant information, indicating how the design will make a contribution).
- 3. Data Collection and Analysis
  - Methods Used to Collect Data
  - Methods Used to Analyze Data
  - Validation or Pretesting Procedures
- 4. Detailed Analysis of the Problem
- 5. Applicable Theory
- 6. Design
- 7. Creation of the System Solution
- 8. Testing and Evaluation

**3. Possible Design Report (as Honors Thesis) Table of Contents:**

- 1. Executive Summary
- 2. Statement of the Problem
- 3. Background of the Problem
- 4. Goals/Objectives of the Design Project

5. Assumptions
6. Methodology Being Pursued in the Design Activity
7. Analysis Undertaken
8. Synthesis of Alternative Solutions for the Project
9. Evaluation of Alternative Solutions
10. Cost Analysis of the Alternative Solutions
11. Special Considerations for Engineering Design (Ethics)
12. Conclusions and Recommendations