2019-2020 Guidelines To

Capstone Project

Fan Gongxiu Honors College

GUIDELINES TO CAPSTONE PROJECT 2019-2020

Fan Gongxiu Honors College, BJUT

I. Overview of the Capstone Project

The Capstone project at Fan Gongxiu Honors College is a research thesis or creative project in the major program you have selected to graduate with. You are mentored by a faculty member whom you have asked to supervise you, and you complete a project that serves as the “capstone" of your major. It starts from the Spring Semester of your junior year and lasts till the end of your senior year right before graduation. It is the most comprehensive project that demonstrates your integration of achieving student outcomes developed, both theoretically and practically, from your undergraduate programs. Graduating seniors routinely cite it as the most important academic part of their undergraduate education.

II. Educational Objectives/Student Outcomes

The purpose of the Capstone project is to provide an integrative experience for seniors that ties together the key learning objectives identified by the departments and Honors Colleges that are consistent with what is required by CEEAA and ABET to meet the mission of the University Undergraduate Education. Capstone projects are expected to demonstrate reflection, critical thinking, effective communication, etc., that fully support the student outcomes set forth by CEEAA and ABET.

The required student outcomes described by ABET (2019-2020) are listed below.

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

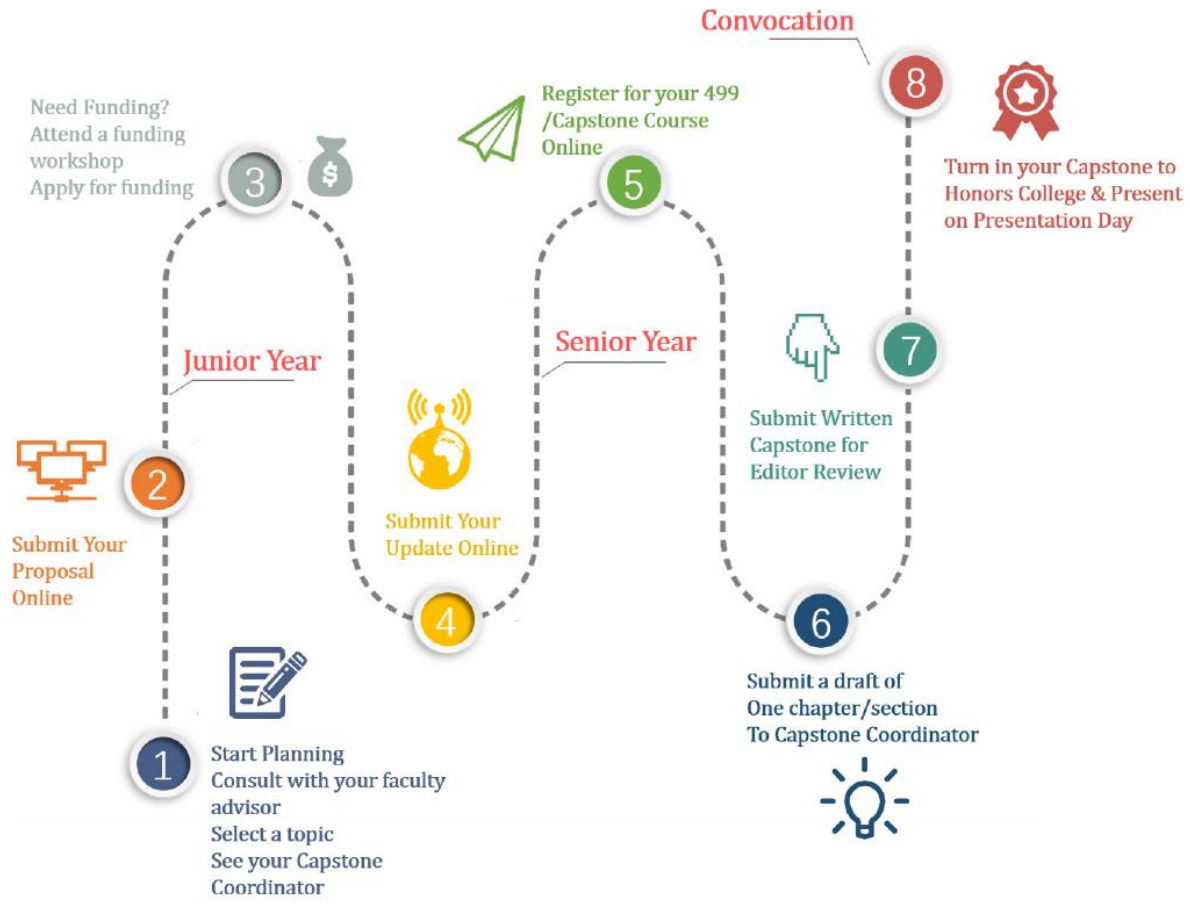
III. Types of Projects

Capstone project aims at an in-depth comprehensive work to wrap up your undergraduate study by connecting fundamentals knowledge with major skills through a real-world problem solution. Due to its highly-engineering nature, similar to the Keystone project, the appropriate types of projects are suggested as follows.

1. **Industry Solicited Projects:** We have on campus 7 Excellent Engineers Programs awarded by Ministry of Education, among which students are closely connected with industrial partners. We can take advantage of this as a resource. In this type of project, industry representatives would define the project requirements, and provide guidance to the student team during the semester. These projects are often those which the company needs to have completed, but either does not have the resources to complete, or is willing to treat them as "back-burner" needs. Sometimes the project can provide opportunity for a fresh look at efforts underway within the company. The company needs to identify a resource person within the firm to answer student questions, meet with the student team periodically for progress reviews, and attend the final presentation at the end of the project.
2. **Faculty Research Projects:** Each faculty member has several undergoing research or design projects awarded from various sources, either at national-level or municipal-level, or even from military or other types industries. Join a faculty research team and talk to them to see if an independent part of the design/research efforts can be carved out as your Capstone project. These projects also have opportunities for industry participation or sponsorship. Please be aware that the university-level extra-curricular projects announced every year, such as the Spark Project, National Innovation and Entrepreneurship Project, Excellent Student Training Project, etc., may not be very appropriate as your Capstone choice as most of these are usually exploratory in nature and required much less efforts.
3. **Student Design Competitions:** There are several engineering organizations that sponsor student design competitions. Our university revises and publishes a list of such student competitions every two years. For example, IEEEXtreme is a global challenge in which teams of IEEE Student members—advised and proctored by an IEEE member—compete in a 24-hour time span against each other to solve a set of programming problems. The next competition IEEEXtreme 11.0 will happen in Fall, 2018. Other student design competitions include National Virtual Instrument Competition, National Electronics Design Competition, National Mechanical Design Innovation Competition, etc., as well as others at provincial and municipal levels. These projects also have opportunities for industry participation or sponsorship. You can take advantage of these competitions to form a complete solution of a real-world problem as your Capstone choice.

IV. Basic Process Overview

A schematic flow of your Capstone project timeline is illustrated and explained as follows.



1. Planning Your Capstone

There are many good resources that will help you start planning your Capstone project:

- Browse and search our undergraduate advisor archives that provide a description on the faculty research interests.
- Talk to faculty from a class that interested you.
- Visit our Capstone Coordination Office and talk to the Capstone coordinators.
- In the second week of Spring Semester of your Junior year, you will be required to attend a Capstone planning assembly.

As an engineering student, you have already been involved in lab work through your Cornerstone, Keystone, or other relevant projects. Some students have already secured a place in the lab by sophomore year. At this point, you should work with your advisor to delineate a solid project of your own within the lab's larger enterprise. It will be a "piece" of the lab's project for you to manage independently, within the team context of the lab. However, you may also design your own experiments, and you will certainly conduct them, collect your own data, analyze it, and write it up in the context of existing research in the field.

Make sure you understand that your Capstone will follow the standard format of a journal submission in your discipline in addition to the thesis requirement for graduation.

By the time you attend a Junior Capstone Assembly, you should at least have an interest that you want to narrow down into a topic.

2. Submit Your Proposal

Once you have found your advisor and developed your topic and project plan, submit your official proposal to Honors. The Capstone Proposal Guidelines will be posted separately after the Junior Capstone Assembly. Please refer to the guidelines for details on what our expectations are for your proposal document, and then submit the standard Capstone Proposal Form.

Remember that you only need a tentative detailed plan for the entire project. Your proposal should be a clear exposition of your project idea, and represent your best current understanding of what the project involves. We know, and so should you, that the project will evolve as it progresses.

Your advisor will help you refine your topic as you work on the project – narrowing or expanding as necessary.

3. Need Funding?

It is suggested that you should try to secure funding to work on your projects before your projects start. Some advisors will provide funding from their own research projects. Many engineering students are supported through the Spark Funds (Research Experience for Undergraduate) and National College Student Innovation and Entrepreneurship Training Projects. Different from the Cornerstone and Keystone projects, Capstone projects envision much higher expectations; thus additional funding opportunities are also available from our Coordination Office in the Honors College. The amount of funding awarded is based on your application in the Capstone proposal and will be subject to a committee evaluation to see if your project could benefit from additional funding. You have to defend your proposed projects as an appropriate one and you or your teams are the right one to push forward the projects.

4. Update Your Project Progress

Once you are a senior (and have been working on your project for a while) you will submit an update of your project to Honors College. Continue working on the project through the Spring Semester and Fall Semester, meeting every few weeks with your advisor. Submit a Capstone Update Form – due the first week in December 2018. The Update asks for information on your progress: an initial bibliography, a brief explanation of your methodology, and a fleshed out timeline.

This is your way of letting us know that you are making progress, and that your advisor

agrees as to the pace and quality of your work. It also helps assure that you, your advisor, and the Honors College are all “on the same page” about your progress and the timeline for your future work.

Around the time of your update, you should also find your Honors Reader, and let Honors College know who that person is. Along with your Update, you'll submit one chapter/section of a draft of your final Capstone to your advisor and your Capstone coordinator in the college.

5. UHN 399 and UHN 499 Course Registration

You will devote considerable time and energy to your project, and your efforts on the Capstone projects are bundled with academic credit towards graduation. The UHN 399 and UHN 499 registration are how you do that. Everyone is required to register for two to three credits for the Capstone project in their Spring semester of junior year and two semesters in the final senior year. To be more specific, by the end of Fall Semester of your junior year, you have to enroll for the UHN 399 for Spring Semester of 2018; by the end of Spring and Fall of 2018, you have to enroll for UHN 499 of the following semesters, respectively. That puts a total of 8 credits for the Capstone on your transcript, and provides your advisor with a mechanism for grading your work. We will work on the enrollment processes similar to your enrollment of General Education Electives you have done in the University Academic Administration System.

6. Find Your Reader

Your Honors Reader is usually a faculty member in your major or a thematically related field. Make sure you ask, in person, if someone will serve as your reader. It can be any faculty member; it does not need to be one "officially" affiliated with the Honors College or the Capstone project, and it does not have to be someone in your major.

7. Submit a Draft of One Chapter/Section

In the first week of December of your senior year, you will be required to submit one chapter/section of a draft of your final Capstone thesis to your advisor and your Capstone Coordinator. This will be required right before you register for your UHN 499 course of the last semester.

8. Submit Written Capstone Thesis for Editor Review

About a week prior to the final turn-in of your Capstone thesis, you will be required to submit your finished thesis to the Capstone coordination office for our editing process. One of our editors will review your Capstone thesis for writing quality (grammar, structure, flow) and will either approve your Capstone thesis for turn-in, or they will flag your Capstone for further editing.

This process gives you the opportunity to learn the importance of final editing and polishing your Capstone thesis before you turn it in for its final submission.

9. Turn-In, Present and Defend Your Capstone

Due to a fixed schedule in the graduation season of the university, thesis submission and defense usually have to be completed before the last working day in the 16th week of the Spring semester of your senior year. Therefore, late submission will definitely cause extended duration of your undergraduate study, possibly to September or even the following January. Please plan ahead.

You will also have to pass the defense of your Capstone to earn credits for UHN 499 in the Spring semester of your senior year. Make sure you understand that thesis defense in the Honors College will require longer time for presentation and more rigorous and comprehensive Question and Answers. The turn-in day information (deadlines, full instructions), and details regarding presentation day will be posted at the beginning of the last semester in your senior year.

V. General Information and Requirements of the Capstone Project

1. The Capstone project has to be performed on an independent basis. In the case where a team has to be formed, you must get approval from the Capstone Coordination Office. Even a project is conducted in teams, each student has to carry out his or her independent part to form a complete solution towards a defined problem.
2. The Capstone project differs from Cornerstone and Keystone projects in that it has to be highly relevant to the major you plan to graduate with. However, interdisciplinary efforts are highly encouraged when engineering work in your major study is involved with societal, economic, legislative, management issues, etc.
3. You have to prepare a lab book with continuous page numbering from the first day of the Capstone project. Arrange a meeting with your faculty advisor at least once a week and have him sign and date your lab book. The lab book records will be counted as your final grade of the Capstone project. It has to be submitted before graduation.
4. For important dates along the timeline, please refer to the Basic Process Review session.