CAPSTONE PROJECT GUIDELINES

M.S. in Energy Policy & Climate and
M.S. in Environmental Science and Policy Programs

Advanced Academic Programs,
Krieger School of Arts & Sciences
Johns Hopkins University

1. Overview

1.1 Synopsis of Capstone Project

The Energy Policy & Climate (EPC) and the Environmental Science & Policy (ESP) programs, hereafter referred to as EPC-ESP programs, provides a course to develop a research paper or project report. The course is mandatory for the students in the EPC program and is optional for student in the ESP program, except for those doing a concentration, for whom it is required. The course is designated as the EPC-ESP Capstone Course, 425.800, entitled 'Research Design for Capstone Projects in Energy and Environmental Sciences' and is designated in this document as 'The Capstone Project.'

The Capstone Project requires students to engage in research and apply the multi-disciplinary knowledge

they have acquired during their program of study to a real-world question focused on energy or environmental issues. The Capstone Project also allows students to integrate skills and knowledge gained from program coursework and experiences as well as to practice the full complement of communication skills, including written reports and public presentations.

Students must work individually on a project mentored by someone with substantive knowledge of their topic. This person could be working at a governmental agency, a not-for-profit group, a member of the JHU faculty, or other organization with relevant expertise. The project is overseen by a course instructor, currently the EPC Director, and should result in a deliverable, such as a written report, and a formal presentation to be given in class. Also, a yearly event called the EPC-ESP Symposium (Capstone Day) will be held in at the end of the spring semester. The course will be taught in hybrid format (with teleconferencing options) and online (asynchronous option with material available via Blackboard for distance students) and will include weekly discussions and individual meetings, along with a mid-semester progress report that will help ensure that the project is kept on-track.

A list of recent EPC projects can be found on the EPC Capstone page here and recent Independent Research Project from ESP are posted under here. Also, for sample proposals please contact the course instructor Dan Zachary d.s.zachary@jhu.edu or Nicole Cosey ncosey1@jhu.edu for more information.

1.1.1 Scope and Final Products:

The Capstone Project allows greater flexibility in topic, process, and presentation than a traditional Master's thesis. Each Project will commence with a 1) a proposal drafted the semester before the course, followed by a 2) draft report to be completed in the context of the Course, and 3) a final report to be completed at the end of the course. The final product will take the form of a report or research paper, preferably of publishable quality, a business plan or proposal, a model/prototype with a surrounding description, curricular material, or a series of recommendations to an external client, etc. Students will present their work and final products in class as part of their course work. An annual EPC-ESP Capstone Symposium (Capstone Day) will be held at the end of the spring semester and students are encouraged to attend (pre-recorded presentations are an option for student who are not able to come in person). If a student plans to work on a project that may contain privileged information, this should be referenced in the proposal and discussed with course instructor and mentor.

2. Project Planning and Proposal

2.1 Requirements of the Capstone Project

- Prior to embarking on the Capstone Project, a student should have completed at least eight (8) courses toward the EPC or ESP degrees or be taking their 8th course concurrently. Exceptions are made only if a student plans to graduate in summer as this course will only be offered in the Fall and Spring semester. Contact course instructor for possible other exceptions;
- Capstone Project proposals must be developed during the summer or semester prior to conducting the Capstone Project and be approved by the course instructor and the project mentor;
- Adjustments to the project's scope and timeline may be made as warranted (if, for example, students run into a hurdle that requires a deviation from their proposed plan) and should be worked out with the course instructor and mentor;
- Students must register for 425.800 (Research Design for Capstone Projects in Energy and

Environmental Sciences) during the semester in which they are conducting the Capstone Project.

2.2 Advising and Project Mentors

Choose a Mentor. The mentor may be: a) a JHU faculty member teaching in one of the Environmental programs (ESP, EPC, GIS) or elsewhere at JHU, b) an appropriate person from the student's place of work, or c) any expert with appropriate credentials. The mentor is the person who will guide the substantive progress of the capstone project and, ideally, the mentor is currently involved in some aspect of the proposed work. Mentors who have not previously worked with Johns Hopkins must be approved by the course instructor. Once you have identified a mentor, please obtain a recent CV or resume from that person. Forward the resume or CV together with their contact info (name, title, phone number, email, and postal address) to the course instructor who will determine whether the mentor is qualified to serve in this capacity. The environmental programs do offer a stipend to mentors, payable at the completion of the project, and the course instructor will arrange for this directly with the mentor.

All mentors will be required to sign a Mentor Agreement Form committing them to supervision of the project and outlining their compensation for serving in this capacity. Non-JHU Mentors must also completed a W-9 inorder to receive the honorarium. Note: Mentors who are non-US persons residing outside the US may not necessarily receive an honorarium. This is country and person specific and should be clarified as early in the process as possible with the course instructor.

2.3 The Proposal

A proposal is a document that serves as a guide to the research you will undertake in your Capstone Project. It should be at least 6 pages and no more than 10 pages (double-spaced) or 1500 – 2500 words, and should include an informative yet succinct title. Coming up with a good title is important as it forces focused thinking about what you want to do. Note that the proposal title need not be the same as the final project title as your focus may change in the course of conducting your project. The proposal should include the sections listed below and should be as specific as possible. Please number your pages. The process of proposal development is to first discuss the project topic with the course instructor and your mentor, and then to refine the proposal before it is submitted to the course instructor for approval.

Introduction. This section should include a 'statement of purpose' including a research statement (RS) and/or hypothesis (H) to be tested. *Please put the RS/H in italics in your introduction*. The objectives for the project are also listed here. It should address specifically what the project will be about and why anyone would care about the topic and your anticipated findings.

Literature Review. This section should review your topic, identifying what is known about it and what is not. From this should come a discussion of what your contribution will be to the existing body of knowledge. Be sure to review the academic literature as well any 'gray' literature and materials available on the web. It is important to make the review comprehensive and to focus on citable references, by which we mean mostly peer reviewed academic publications. The library offers excellent tutorials on research and can help you refine your literature searches. We recommend that you engage with the services available to you! Please think carefully about what constitutes a reference; there is much more to a research literature than a quick search via a search engine!

Methods. What type of methods will you use to answer your research question or test your hypothesis? If you have to sample data, describe how you will select it, and what your criteria will be for sampling. Describe whether your methods will be quantitative or qualitative. Be as specific as possible. How will you obtain

your data? If you will undertake primary data collection, explain how you will do this, and if this involves human subjects, alert the course instructor promptly as human-subjects clearance may be necessary.

Plans for Analysis. What are your plans for analyzing your data? Will you use specific statistical or other tests or methods of analysis?

Expected Findings. This is hard to do but try to anticipate what you might find.

Planned Deliverables. What will be the product of your project? Be specific and realistic.

Timeline. The timeline for course material is given below. Details of any course related deadlines will be communicated by the course instructor. If you have constraints that could alter these, please discuss an alternate timeline with the course instructor and your mentor. Please insert your own timelines using the one here as a guide. Please do not just reference the timeline.

References. Include all references cited in your proposal, including websites (Chicago style is recommended).

Privileged information. See Scope and Final Products (1.1.1).

Title of proposal document: You must label your proposal: (using SP, FA, SU for Spring, Fall, Summer) as done here:

EPC_CapstoneProposal_ Semester_Year _Name   or
ESP_CapstoneProposal_ Semester_Year _Name.

Note: The student will need to already possess the required skills to undertake the project. If the project requires training and/or learning new skills, then this should be described in the proposal.

2.4   The final report

We will follow the outline of a research paper described in 'Anatomy of a research paper' (AORP) available in the Student Café area in Blackboard. A draft project report (Word doc)will be submitted within the context of the course. An adequate project length is 25-40 pages, double spaced, and lays out clearly how the project was conducted and what the findings are (6250 – 10'000 words).   The following sections are typical for a research-style paper.
Note: other final report templates are possible – for optional style projects, such as the aforementioned business plans, models/prototypes, curricular material, series of recommendations for an external client, or even other types of qualitative research paper. A template for these alternate projects should be discussed with the instructor.

Title page. This page will include the title, date, the name of the student and the name of the project mentor and affiliation.

Table of Contents

An Executive Summary.   The executive summary (1 page) should explain how the project integrates the students' professional work and expertise developed during matriculation in the EPC or ESP program. It should clearly state the significance of the Capstone Project, what scientific, technical, and

policy knowledge has been gained in the course of conducting the Capstone Project.

Introduction. This section should include a 'statement of purpose' including a research question and/or hypothesis to be tested. The objectives for the project are also listed here. It should address specifically what the project will be about and why anyone would care about the topic and your anticipated findings.   This section should contain relevant information on the background of the project. (See AORP available in the Student Café on Blackboard.)

Methods. The section should describe in detail how the study was performed. Ideally, after reading your methods section another researcher could duplicate your study. (See AORP available in the Student Café on Blackboard.)

Results section.   This section should simply state the findings. No opinions, biasing, nor interpretations go here. If the methods section has listed experiments in order, the results section should follow the same sequence. At the very least, the results should be provided in a logical sequence, often along the timeline of the study. (See AORP available in the Student Café on Blackboard.)

Discussion section. In this section, revisit the research question and hypothesis that were stated in the introduction. Then explain how your methods were used to answer the question or test the hypothesis, and how the provided results now answer the question. The discussion section is the place for interpreting the results. Use statistical results to make conclusions regarding the research question. In other words, if the hypothesis is statistically confirmed by the results, what does that mean? (See AORP available in the Student Café on Blackboard.)

Acknowledgements - Optional but appropriate to include if you received significant assistance from someone beyond your Mentor and course instructor.

Cited References. Include all references, including websites, cited in your report, consistently cited (Chicago style is recommended).

Deliverable   The Final Project Report draft must be submitted to the mentor and the course instructor one week before the last day of the semester in PDF format. The final report is due on the last day of the semester. The mentor's evaluation and grade recommendation will be submitted to the course instructor within 72 hours of receipt of the final day of the semester.

Title of final document: You must label your final report: (using SP, FA, SU for Spring, Fall, Summer) as done here:

EPC_CapstoneFinalRep_Semester_Year_Name   or
ESP_CapstoneFinalRep_ Semester_Year _Name.

2.5   The approval process

- Proposals must be submitted electronically to the course instructor and the mentor according to the timeline in Section 5.
- Proposals will be reviewed as quickly as possible and comments submitted to the student(s);
- The proposal must be approved, via email, by both the mentor and the course instructor.

3.   The Capstone deliverable

3.1   The final project report

Details of the final report are given above.

3.1.1.   Digital Version of the Capstone Report

General information

You will need to submit your final capstone paper electronically so that it can be posted on the JScholarship website: https://jscholarship.library.jhu.edu/ . This submission is mandatory so that it can be housed within the JHU community. To do so, in addition to forwarding me your paper in pdf format, you'll need to sign the attached Non-Exclusive Deposit agreement (where it says Contributor) and send back to Nicole Cosey (ncosey1@jhu.edu) giving the University permission to upload your paper to JScholarship. Also, you'll need to provide 3-4 subject keywords on your paper that will be used with your online submission. Please let me know if you have any questions, thanks!

For the capstone formatting guidelines, instead of having actual documents, we should refer students directly to the guidelines on the library's website here:
 https://www.library.jhu.edu/library-services/electronic-theses-dissertations/formatting-requirements/.   The title page example and all formatting guidelines are there. We should also highlight that students do NOT submit their paper via the ETD tool, but they submit it at the end of the semester and it will be posted in JScholarship (https://jscholarship.library.jhu.edu/).

Procedure

1. Capstone Formatting – see specifics here:
        https://www.library.jhu.edu/library-services/electronic-theses-dissertations/formatting-requirements/
    a. Non-Exclusive Deposit Agreement EPC and ESP
    b. Review animal rights code (if applicable)
2. About one week before the end of the term (class announcements will be made), send a draft (Word doc) to mentor and course instructor for review (D.S. Zachary d.s.zachary@jhu.edu)
3. Once you get your feedback from your mentor and the instructor, you can send to Nicole Cosey to have your format checked, ncosey1@jhu.edu
4. Only after receiving approval from the course instructor, you can send to: Nicole Cosey ncosey1@jhu.edu will finalize the submission to JHScholarship.

3.2   Capstone Presentations

- All students are required to make a formal 10-15 presentation in class. Also, the student is encouraged to present their work to the EPC-ESP community and invited guests, which can include the mentor, JHU faculty, fellow students, and other key stakeholders in the Project. The presentation will be made during the Capstone Project Symposium, held at the end of the

Spring Semester.

- Examples of past presentations, both onsite and online can be found in Blackboard here: https://blackboard.jhu.edu/webapps/blackboard/content/listContentEditable.jsp?content_id=_2428176_1&course_id=_86745_1

- Should a student not be available for the final presentation, then a pre-recording of the presentation will be made for showing at the symposium. See online presentation in BB for examples.

- The presentation should have the following: background, methods, results, discussion, conclusions, and references. Also, the presentations should also highlight the project goals, major challenges and barriers that were overcome in the course of conducting the project, the project outcome, and should include a description of the final product;

- Presentations should be understandable by non-experts, but should also contain enough detail to satisfy project Mentors or clients;

- Students should prepare presentation slides in PowerPoint or other presentation software and may use props, handouts, or other visual aids as appropriate;

- As in the case for all professional presentations, students should practice their presentations to ensure fluidity and adherence to the time limit, preferably in front of an audience who can provide constructive feedback;

- Symposium presentations may be videotaped, with the permission of participants, and posted on the EPC-ESP website.

4.   Grading

- Within 48 hours of the end of the semester in which a Capstone Project is completed, mentors need to suggest a grade for students who have conducted a project under their supervision.
  - The suggested grade shall be submitted to the course instructor by the mentor;
  - While the recommended grade of the mentor will be given great weight in the grading process, the course instructor will independently review all project deliverables and make grading decisions for all Capstone Projects;

5. Capstone Project Schedule

Action	Fall Project	Spring Project
Initial communication with Program Director	**June 1**	**November 1**
Submit name of proposed Project Mentor with CV or Resume if new to JHU	June 7	November 7
Approval of proposal Project Mentor by EPC Director	June 10	November 10
Commitment from Project Mentor	June 30	November 30
Draft Project Proposal – please send to EPC Director, include name, title on paper and file.	**August 15**	**December 15**
Approval of Final Project Proposal by EPC Director or Request for Revisions	August 25	January 9
In class		
Progress Report - ½ page to 1page general update	Week 9 of class	Week 9 of class
Check-in with the course instructor to review any pending issues	Week 10-12 of class	Week 10-12 of class
Draft Report (Word doc submission, via email, to Project Mentor and EPC Director) Final Report (submission, via email, to Project Mentor and EPC Director)	Week 13 of class	Week 13 of class
Final Report (submission, via email, to Project Mentor and EPC Director)	Last day of class (draft, one week before end of semester)	Last day of class (draft, one week before end of semester)

EPC Capstone Project Symposium (Capstone Day)	None – see spring event	End of Spring Semester (generally in May)

6.   Institutional Review Board (HIRB)

Electronic Homewood Institutional Review Board (eHIRB).

Users should log in using their JHED ID and password. Logging on once automatically creates an account. Mandatory training can be found here:

https://homewoodirb.jhu.edu/documents/citi-training/

additional information is here:
https://homewoodirb.jhu.edu/files/2018/10/PP-10.26.18_clean.pdf , on
https://homewoodirb.jhu.edu/investigators/ .

https://homewoodirb.jhu.edu/documents/citi-training/

For more information.

Johns Hopkins Medicine
Institutional Review Boards

Office of Human Subjects Research
1620 McElderry Street
Suite B-130, Reed Hall
Baltimore MD 21205
(410) 502-2092 Fax (410) 955-4367
jhmeirb@jhmi.edu