Assistant Professor Jaye Falls
Office: Rickover 350; Phone: x3-6429
E-mail: falls@usna.edu

August 2016

Independent Research Courses
EN495/EN496/EN503H/EN504H
Course Policy Statement

1. **Background**: A basic foundation of engineering is the drive to improve society through the advancement of technology. While the generic term for these efforts is "research", in engineering we often call it "research and development" and it includes efforts that range from furthering the basic understanding of the underlying science to improving an existing engineering concept, design or technology through testing and modification. To provide a valuable educational experience your project should fit within that range. In most cases, a project that only repeats work that is already documented is not considered research and would not be appropriate for these courses.

2. **General**: These courses provide an opportunity for students to investigate a particular topic in-depth, outside the normal course format of lectures and labs. As the title implies, the nature of these courses is independent research, rather than closely-directed activities. Your faculty advisor (or mentor) is just that, an advisor, not a supervisor. The responsibility for achieving a successful outcome is the student's! The faculty and staff are available to provide guidance and support. These projects are often cited by engineering students as the highlight of their undergraduate education and often provide a significant advantage when looking for a job or applying to graduate school. Good projects are those that are both challenging and fun! Some past NAOE student projects have provided significant benefit to the Navy.

3. **References**: See ACADEMIC DEAN AND PROVOST INSTRUCTION 1531.79A "MIDSHIPMAN RESEARCH COURSES" and the relevant NAOE web pages for more information.

4. **Proposal**: Every research course requires a project proposal from the student. The proposal will be reviewed for technical merit as well as the feasibility to complete the project at the Academy within the time and budget available. As this review process may take a month or more, your Research Advisor must approve the proposal by the end of the Registration period for that semester (e.g. in April for a Fall Semester project). Proposal templates are available on the NAOE website. Note that if you plan to use a lab or require other USNA facility support (such as a boat from Navy Sailing, the Hydro Lab or the Model Shop), you will need to get a letter from the supervisor or director of that group confirming that they can provide the support. Budgets in most cases will be less than $500.

5. **Credits**: EN495 (fall) and EN496 (spring) are three-credit courses.
   EN503H (fall) and EN504H (spring) are three-credit courses for students in the Honors Majors.

6. **Learning Outcomes:** Upon completing these courses the student will be able to,
   1) Develop and present an original research project proposal
   2) Conduct original research or design in an engineering field
   3) Apply experimental and/or analytical techniques used in naval architecture, marine or ocean engineering
   4) Demonstrate an ability to perform relevant review and documentation of published resources
   5) Document their research in a publishable format
   6) Discuss their research in a professional manner with other engineers

7. **Workload:** As these courses are predominantly experimental in nature they are considered “lab hours”; meaning that a two-credit course is equivalent to spending four hours a week in lab. The normal college homework ratio is 1:1 based on lab time, so four hours in lab has an expectation of four additional hours of work outside the lab. This means that the total workload for a three-credit course is 192 hours per semester. These numbers should be used in estimating the time required to complete the work outlined in your proposal as well as a rough guide for your time management during the semester.

8. **Plagiarism:** As original research leads to professional recognition it is important and fair that those who discovered or developed new ideas or designs are correctly identified. Plagiarism is a form of intellectual property theft and is unethical and unprofessional. A person caught plagiarizing may be professionally tarnished for life. Understanding what it is though is often difficult. The Academy has provided clear guidance for writing, which must be followed when composing your reports. The Academy is not as clear about engineering or specifically the nature of marine design development. Our industry follows the general guideline that it is expected that you will benchmark your design against other proven designs but that you will not copy them exactly. Do not hesitate to discuss this with your advisor or course coordinator if you have questions.

9. **Exams**: There are no exams!

10. **Labs/Shops**: At the beginning of the project you should request after hours lab access as necessary from the lab directors. During the project you should keep the impacted lab and shop staff informed of your progress. **You should acknowledge the staff support in your reports and papers**.

11. **Research Meetings:** Meetings fall in to one of three categories. In the Honors program there are mandatory weekly meetings in the Fall semester where all the scholars meet together. All research students are encouraged to meet their advisor each week to review progress and plan activities. Faculty advisors may require addition meetings with their advisees.

12. **Deliverables**: The required deliverables for these courses include:

    1) Project proposal using the NAOE template
    2) Proposed outline of the final report and a timeline by the end of week three
    3) Project poster for the Fall semester (EN495 only).
    4) Project poster for the Spring semester (EN496, EN504H).
    5) Final report. This may be replaced by an article ready for submission for publication.

    The length of the final report varies depending on the specific project. Typically a three-credit project will be 25-50 pages. A technical publication article is typically 8-12 pages, but the format is quite a bit more compact than a report. The poster, final report and article must be submitted both as complete hard copies and electronic copies (in the file format it was generated in as well as pdf).

13. **Two-Semester Projects**: Projects that span two semesters (excluding preparatory research courses) have a higher expectation. The first semester will conclude with an interim report of about the same length as a final report and the final report at the end of the project will generally also include most of what was in the interim report, so may be longer. Based on the interim report a determination will be made whether to continue the project in the second semester. A new proposal is not required for the second semester.

14. **Grading Policy**: The course grade is determined by the research advisor. Students are encouraged to discuss expectations with their advisor at the beginning of the semester.