Description: Capstone experience in physics.

Goal: Synthesize and apply conceptual understanding and practical knowledge gained from coursework to perform scientific research and to complete a semester-long project.

Eligibility: Physics majors are required to complete a Senior Project in their final year. Students are strongly encouraged to discuss research interests and potential projects with faculty members at any time during their studies, but must select a supervisor and identify a general research topic by the end of the semester prior to commencing their project.

Projects: Projects should consist of a methodical investigation to establish new knowledge in physics or physics education, for example, by proving (or disproving) a scientific hypothesis or by providing a novel answer to a specific question. The research must be original but does not have to be publishable. Core parts of the research, such as experiments, computer simulations, or derivations cannot be outsourced but must be conducted by the student. Ineligible projects include, but are not restricted to: literature studies, solely repeating work from published papers, exegesis of scientific papers or books.

Work Load: Students must begin work on the project at the start of semester and are expected to spend $\sim 12$ hours/week, including meetings with the supervisor.

Evaluation: A faculty committee oversees Physics 489 and assigns final grades.

Advisor: The advisor must be a regular tenured or tenure-track faculty member in the NDSU Department of Physics. Exceptions can be made only in extenuating circumstances, but require approval by the capstone committee.

Proposal: By the last day of finals week of the Fall 2014 semester, December 19 students must submit to the Physics Department office a short proposal (maximum of 3 pages), including (1) the name of the faculty supervisor, (2) a tentative title, and (3) a brief description, including motivation, objectives, methods, a plan/timeline, and references. All proposals will undergo review and must be approved by the committee.

Selection of a feasible and interesting project is a key to success.
Schedule: The following reports/presentations are required:

1. Midterm oral report (after eight weeks): 20-min presentation and questioning by committee.

2. Draft of written report (must be submitted prior to final oral report).

3. Final oral report (at the end of the semester): 30-min presentation and examination by committee.

4. Final written report (due after oral report): a revision, incorporating feedback from the draft of the written report and from the oral report.

Deadlines are set by the committee and can be extended only under exceptional circumstances. Written reports must follow the AIP style manual format: http://www.aip.org/pubservs/style/4thed/toc.html.

Grading: Grades are based on the quality of the project proposal (5%), the midterm oral report (5%), the final oral report (30%), and the final written report (60%).

The final grading scheme is: A: 90-100%, B: 75-89.9%, C: 60-74.9%, D: 50-59.9%, F: < 50%

All reports and presentations must be on a technical level that is understandable by someone with a general physics background, e.g., comparable to a Scientific American article.

Missing a deadline could lead to a reduction of the final grade by one or more letter grades, and in severe cases, at the discretion of the capstone committee, could result in failure of the class.