Physics 171 - INTRODUCTORY PROJECTS IN PHYSICS (1 credit) – Fall 25

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Specific Course Information:

Instructor: Sylvio May, South Engineering 216A,
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Faculty Mentors: Alan Denton, Alexander Wagner, Andrei Kryjevski
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The instructor also serves as Faculty Mentor.

Bulletin Description: (*pending approval*) This course is designed for first-year students who plan (or consider) to pursue a degree in physics to work with peers on introductory physics projects. In small groups, students complete multiple projects, typically open-ended problems that may or may not have a hands-on component. Student groups are supported by faculty mentors and share ideas and approaches with their peers.

Objectives: This course engages students in investigating physics projects, open-ended problems that may not have a straightforward solution. The goal of the course is to inspire students to (1) be creative, explorative, confident, and persistent in addressing a complex physics question, (2) extract information, identify approaches, and seek help when needed, (3) make approximations and perform measurements if needed, (4) communicate with peers and present progress and results. The overall objective is to expose students early to the explorative and collaborative mindset that is one component of a successful physicist career. The course also facilitates cohort formation of first-year students who share an interest in physics.

Prerequisites: none

Meetings: Wednesdays 3pm-4:50pm in South Engineering room 221. According to NDSU Policy 333, attendance of this in-person course is expected.

Office hours: Fri 11am-12pm in South Engineering room 216A.

Textbook and other resources: This course does not have a textbook. Depending on the project type, it may be beneficial to identify and utilize physics books from the NDSU library. The responsible use of online resources is encouraged.

Topic Outline and Timing:
The course consists of two projects for each student, with a final report and presentation at the end of each:

Week 1	Introduction, formation of groups, selection of Project1
Week 2-5	faculty presentations, progress reports, group work on Project1
Week 6	Preparation of presentation and of final report for Project1
Week 7	Presentations and submission of final report for Project1
Week 8	Introduction, formation of new groups, selection of Project2
Week 9-12	faculty presentations, progress reports, group work on Project2
Week 13	Preparation of presentation and of final report for Project2
Week 14	Presentations and submission of final report for Project2
Week 15	Recapitulation and summary of what we accomplished. Collection of ideas for new projects.

Format: Class meetings start with short faculty presentations and progress reports from student groups. The bulk of the course is collaborative work of the students in a group. Each group has a faculty mentor who provides support and guidance if needed.

How to succeed: This course is explorative. Creativity and collaboration are key to success. Pursuing a reasonable idea is valuable even if it turns out unsuccessful. You will have to decide what approximations to make and resources to use. You need to be able to explain what you do and why. AI agents such as ChatGPT can be helpful but be very careful with its unreflected use. Faculty mentors are there to help and provide some guidance, but the key is your communication with your peers.

Course Management System: BlackBoard Ultra

Final Report and Presentations: Each project is concluded by a written final report and a 20-30-minute-long presentation. All students in a group participate in preparing the report and in the presentation. The report is typically a few pages long and must be submitted before the presentation. Each class meeting in weeks 2-6 and weeks 9-13 starts with a ~5-minute-long progress report from each group. Faculty mentors add short presentations to explain underlying physics that is of general interest.

Grading: The maximum score is 100 points. Beyond that, extra credit may be awarded if appropriate.
Project1: progress reports 20 points, final report 10 points, final presentation 20 points
Project2: progress reports 20 points, final report 10 points, final presentation 20 points
Grading scale 0-54 points F, 55-65 points D, 66-76 points C, 77-87 points B, 88-100 points A

Grading of the final reports and presentations assesses the ability (1) to make a compelling case toward investigating a complex physics problem and (2) to convincingly communicate your findings to peers and to faculty mentors.

General Course Information:

- Any students with disabilities who need accommodations in this course are invited to share these concerns or requests with the instructor and contact the Center for Accessibility and Disability Resources as soon as possible.
- The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of the Provost. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.
- Your personally identifiable information and educational records as they relate to this course are subject to FERPA.
- Veterans and student service members with special circumstances or who are activated are encouraged to notify the instructor as soon as possible and are encouraged to provide Activation Orders.