

Physics 171

Introductory Projects in Physics

Fall 2024

Instructor: Dr. Andrew B. Croll
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Office Hours: Andrew: Wednesday 9:00 to 12:00, SE 212b, Zoom or by appointment (Email to find me!)

Description: Basic computer-controlled instrumentation for automation and data acquisition. Design of simple measurement and control projects covering waveforms, temperature measurement and robotics. Elementary data analysis: curve fitting, Fourier theory and statistics.

Course Objectives: After completing this course, students will be able to interface and control instrumentation using computer software; students will be able to acquire data from instruments, plot the data, and apply curve fits to the data; and students will be able to build and operate simple instruments.

Objectives are met by group-oriented project-based learning schemes. Students will be evaluated through their physical progress towards a particular goal, and through the presentation (oral) of their particular solution to each problem and the robustness of the physical outcome (how well conceived is their solution).

Prerequisites: None.

Credits: 1

Class: W 3:00 - 5:00 – South Engineering 321

According to [NDSU Policy 333](#), attendance in classes is expected and will be counted toward your overall grade as described below. **Do not attend if you are ill.** Excused absences must be made-up and zero credit will be awarded for unexcused absences.

Required Course Materials:

- (1) Matlab Software.
- (2) Software Manual (optional)
- (3) Lab Manual (Provided by Department)
- (4) Equipment packets (pickup time must be arranged)

Evaluation:

Introductory Concepts	15%
Projects 1	35%
Projects 2	35%
Participation	15%

Grading:	85%	-	100%	A,
	70%	-	85%	B,
	60%	-	70%	C,
	50%	-	60%	D,
	0%	-	50%	F.

Introductory Concept Mark: 2 – Group Achieves Project Goal
 1 – Group Has Made Progress Towards Project Goal
 0 – Group Has Made No Significant Progress

Project Mark: 5 – Chalk Talk: Group must demonstrate the outcome of their project, and demonstrate an understanding of structural and software design.
 5 – Project: Is the project functional? How well does it accomplish its goal? Style. Completeness. Creativity.
 10 – Report: A 2 Page (double spaced) report from each individual in a group. The report is a written description of the project, intended to instruct a peer in its purpose, construction and operation.

Participation Mark: 2 – Student attends and contributes to group
 1 – Student attends
 0 – Student is not present

Make-up Policy: Contact prior to missing class when possible. Make up time can be scheduled when possible, however, if deemed necessary to keep up with new work, participation marks may be forgiven.

Service Members: 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.

Special Needs: Any students with disabilities or other special needs, who need special accommodations in this course, are invited to share these concerns or requests with the instructor and contact the Disability Services Office (<http://www.ndsu.edu/disabilityservices/>) as soon as possible.

Academic Honesty: 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 Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.

Health and Safety: If you are ill, please stay home and get some rest. Class will have to be made up at a later time.

In accordance with NDSU Policy 601, failure to comply with instructions, including this syllabus, may be handled according to the Code of Student Conduct resolution process and may result in disciplinary sanctions.

Food and drink are not permitted in class unless a student has a documented accommodation through Disability Services. Students will have to remove their masks to eat or drink.

Additional Resources for Students: As a member of the NDSU community, resources are available for you should you need help in dealing with adverse reactions to things happening in the world today. A variety of resources are listed below:

For students on campus and remotely (telehealth):

Counseling Services: 701-231-7671; <https://www.ndsu.edu/counseling/>

Disability Services: 701-231-8463; <https://www.ndsu.edu/disabilityservices/>

Student Health Service: 701-231-7331; <https://www.ndsu.edu/studenthealthservice/>

Dean of Students Office: 701-231-7701; <https://www.ndsu.edu/deanofstudents/>

In a crisis or emergency situation:

Call University Police: 701-231-8998

Call 9-1-1

Go to a Hospital Emergency Room

Go to Prairie St. Johns for a Needs Assessment: 701-476-7216 (510 4th St. S.)

Call the FirstLink Help Line: 1-800-273- TALK (8255) or 2-1-1

Call Rape and Abuse Crisis Center: 701-293-7273

Course Schedule: DUE TO COVID, ETC. THIS IS A VAGUE GUESS AT BEST

	Topic	Evaluation:
Week 1	Introduction to Software	Plotting a function
Week 2	Introduction to circuits	Assembly of LED circuit
Week 3	Powering a circuit with software	Flashing LED
Week 4	Measuring DC Voltage with Software	Thermometer
Week 5	Measuring Real Data	Plotting the Noise Spectrum
Week 6	Simple Amplification	Making a Noisy Speaker
Week 7	Op Amps	Make an Integrator
Week 8	Project 1	Participation.
Week 9	Project 1	Participation.
Week 10	Project 1	Participation.
Week 11	Project 1	Chalk Talk Presentations
Week 12	Project 2	Project 1 Report Due. Participation.
Week 13	Project 2	Participation.
Week 14	Project 2	Participation.
Week 15	Project 2	Chalk Talk Presentations.
Week 16	Extra Credit Day	Project 2 Report Due. Extra credit (improving, fixing, finishing project 1 or 2)