FLORIDA POLYTECHNIC UNIVERSITY

Syllabus: PHY 3101–Intro to Modern Physics

Spring Semester 2026

Course Information

- **Course Number and Title**: PHY3101-Section 01 – Intro to Modern Physics
- **Credit Hours:** 3
- **Current Academic Term**: Spring 2026

Instructor Information

- **Instructor**: Dr. Ilya Mingareev
- **Office**: IST-2097
- **Office Hours**: M 1:00 – 2:00 pm, W 11:00 am -12:00 pm, F 1:00 – 2:00 pm
- **Ways to Contact You:** imingareev@floridapoly.edu

Course Details

- **Class Delivery:** Face-To-Face
- **Class Meeting Day:** MWF
- **Time & Location:** 10:00 am – 10:50 am, IST-1065
- **Course Website:** Canvas LMS

Official Catalog Course Description: This is an introductory modern physics course designed primarily for students majoring in the sciences and engineering or mathematics. Topics include the special theory of relativity, particle-like properties of electromagnetic radiation, wavelike properties of matter, the Schrodinger wave equation, the Rutherford-Bohr model of the atom, the Hydrogen atom in wave mechanics, many-electron atoms, molecular structure, statistical physics, solid-state physics, nuclear structure and radioactivity, nuclear reactions and applications, elementary particles.

  - **Course Pre-Requites:** PHY 2049-Physics 2, MAC 2312 - Analytic Geometry and Calculus 2
  - **Co-Requisites:** MAC 2313 – Analytic Geometry and Calculus 3
  - **Communication/Computation Skills Requirement (6A-10.030)**: N

- **Required Texts**: Modern Physics, 4th Edition by Kenneth S. Krane | ISBN: 978-1-119-49546-8 (e-Text) | ISBN: 9781119495550 (Loose-Leaf)
  https://www.wiley.com/en-us/Modern+Physics%2C+4th+Edition-p-9781119495468

- **Other Good Texts**:
  - Modern Physics by Tipler and Llewellyn, https://www.amazon.com/Modern-Physics-Paul-Tipler/dp/142925078X.
  - A book written at the time all these things were being worked out: Introduction to Modern Physics (1955) by Richtmyer, Kennard, and Lauristen,

https://www.amazon.com/Introduction-Modern-Physics-F-Richtmyer/dp/B0000CJBKH.
    - Modern Physics, 3rd Edition, by R.A. Serway, C.J. Moses, C.A. Moyer, ISBN 13: 978-0534-49339-4.
    - University Physics – Volume 3, S.J. Ling, J. Sanny, W. Moebs, Openstax, Rice University, ISBN (PDF)-13: 978-1-947172-22-7.
    - Physics for Scientists and Engineers: A Strategic Approach with Modern Physics, 4th Edition | Randall D. Knight | ISBN-13: 9780133942651.
    - Nonclassical Physics: Beyond Newton's View | Randy Harris | ISBN-13: 9780201834369.

- **Equipment and Materials**: (e.g. supplies and software)
    - Scientific calculator (graphing ability NOT necessary)
    - University CANVAS LMS system & University e-mail system
    - Instructor Lectures, Videos, Notes and Handouts
    - Physics Demonstration Tools

- **Course Objectives**: Upon successful completion of this course, you should be able to:
    - **Define** motion, work, energy, power, momentum, equilibrium, and oscillations.
    - **Develop** skills for converting from one-unit system to another unit system.
    - **Demonstrate** the ability to derive units from known formulae.
    - **Solve** problems systematically using Physics laws and principles.

- **Course Learning Outcomes (CLO)**
    - **Demonstrate** mathematical skills required to manipulate and solve physics equations.
    - **Apply** physics concepts to solve problems based on real-world situations.
    - **Connect** figures, diagrams, graphs, and data to underlying physics concepts.
    - **Connect** physics concepts to the real world

- **Alignment with Program Outcomes**: Include alignment with General Education Competency; ABET Student Outcomes; or another professional standard, if applicable, e.g. This course supports General Education competency for scientific reasoning. Program Learning Outcomes and General Education Competencies may be found in the Academic Catalog (http://catalog.floridapoly.edu/). Additionally, outcomes may be aligned with the level of difficulty per Bloom's taxonomy (see the University's Institutional Effectiveness Manual for Academic programs).

Course Learning Outcomes *SLO Table*

Course Learning Outcome	**Learning Level (e.g. Bloom's, Anderson/ Krathwohl; Rogers/Hatfield (ABET Assessment Example)**	**Program Learning Outcome (ABET, GenEd, Other)**
Demonstrate mathematical skills required to manipulate and solve physics equations.	**Remember** Recognize Recall	1

Apply physics concepts to solve problems based on real-world situations.	**Apply and Analyze** Execute Implement Differentiate Organize	1
Connect figures, diagrams, graphs and data to underlying physics concepts.	**Understand** Interpret Compare Explain	3
Connect physics concepts to each other and to the real-world	**Evaluate** Check Critique	1, 7

Students Responsibilities:

Students are expected to take full responsibility for their learning and one way that is demonstrated is by rigorous attendance and participation in class.

- **a)** Meet the requirements for all work for this course including all attendance requirements mentioned below.
- **b)** Know the due dates and attendance requirements for this course.
- **c)** Inform the course instructor of absences in advance if possible, or as soon as possible afterward. See the list of excused absences and COVID-19 for university-specified excused absences and COVID-19 leniencies listed in the attendance standards policy above.
- **d)** Students are expected to turn on their video cameras during the entire lecture or class time (only applicable to remote learners, like LO-Flex or OL courses).
- **e)** Students are expected to attend resuscitation sessions if offered by me (stay tuned)
- **f)** Students are available in Teams during the entire lecture or class time (remote students).
- *g)* **Possible Consequences of Attendance:** *Please follow the course syllabus "Attendance Policy" section to avoid possible consequences of unexcused absences.*

Grading Scale:

Below is the grading scale that will be used in the course.

Grade	A	A-	B+	B	B-	C+	C	C-	D	F
Percentage	≥ 93%	92%-90%	89%-87%	86%-83%	82%-80%	79%-77%	76%-73%	72%-70%	69%-60%	< 60%
GPA	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.0	0.0

Assignment/Evaluation Methods:

A student's class grade will be determined by performance on assignments and tests weighted according to:

Attendance and Participation	5%
Quizzes (Every other week)	5%
Homework	20%
Test 1	15%
Test 2	15%
Test 3	15%

Final Exam (Comprehensive)	25%
Total	100%

- **Quizzes:** Short Quizzes (timed, in-class) comprising one or two problems will be administered every other week to check students' level of understanding of the concepts. These quizzes will be based on the examples and homework problems that the students are already working on as part of the course requirements. The feedback on the quiz's outcomes will be discussed one-on-one with the student. Taking the quizzes will help prepare the student to take their tests and final exams. For missed quizzes, make-up work is at the instructor's discretion. Valid excuses will be accepted with no penalty. Decisions will be made on a case-by-case basis for things other than illness or emergencies. **5%** of grading will be distributed on the short quizzes.
- **Homework Assignments:** Several problems will be assigned for each chapter. The homework problems should be mandatorily worked out and submitted on Canvas. **20%** of grading will be distributed on the out-of-class homework assignments.
- **Tests/Exams:** Three exams will be administered, covering roughly 3-4 chapters, and consisting of problem-solving, derivations, and conceptual questions. Information about each exam will be given in the weeks before the exam. Unless otherwise specified, the final exam and all in-class exams are **closed-book exams**. No notes or other resources are allowed unless otherwise specified. No ***use of cell phones during these exams***. It is your responsibility to have a functional calculator for the classroom, homework assignments, and exams. If you do not have a calculator, you may be penalized a small amount or required to complete the problem in an alternate form, at the instructor's discretion. **45%** of grading will be distributed on the three tests.
- For missed tests/exams, make-up work is at the instructor's discretion. Decisions will be made on a case-by-case basis by University policy. **It is your responsibility to be present for all exams**. If you require ODS/ASC accommodations, **remind me** in the week prior to the exam. You are responsible for planning with the ASC and ODS offices.
- **Final Exam:** ***The final exam is mandatory and comprehensive***. **Final Exam cannot be substituted by any of the previous exam or homework scores.** Final exam questions will be designed to allow students to demonstrate that they have mastered the various segments of the course and that they will also be able to combine their knowledge of these segments to work on more comprehensive problems. ***The final exam will be administered during the final week as per the Academic Calendar.*** **25%** of grading comes from completing your final exam.
- **Lecture Expectations:** The lecture meets for 50 minutes, three times per week. The intent of lecture time is for you to develop your conceptual understanding, practice problem-solving, work on representing physical situations, and improve your observation and thinking skills. The lecture will be interactive - you are expected, at appropriate times, to work with your peer, express your thoughts, ask, and answer questions, discuss ideas, and patiently listen to and respect other's ideas.
- **CANVAS Policy:** Assignments, announcements, and information will be posted on CANVAS. **Students are responsible for checking CANVAS regularly to be aware of their assignments** and other class information.
- **Late Work/Make-up work**: All class assignments will have due dates communicated at the time

of assignment. Acceptance of late or make-up work is at the instructor's discretion. Decisions will be made on a case-by-case basis by university policy.

PHY 3101 — Modern Physics — Spring 2026

Wee	Date	Topics Covered	Reading Quizzes & HW
1	Jan 12, 14, 16	Ch 1-2: Introduction, Special Relativity	Reading Quiz 1
2	Jan 21, 23	1/19 Martin Luther King Jr. Holiday Ch 2: Special Relativity	HW 1 due 1/23
3	Jan 26, 28, 30	Ch 2, continued	HW 2, due 1/30
4	Feb 2, 4, 6	Ch 3: Particle-like Properties of Electromagnetic Radiation	HW 3, due 2/6
5	Feb 9, 11, 13	Ch 4: Wavelike Properties of Particles, Review for Test 1, Test 1	HW 4, due 2/11
6	Feb 16, 18, 20	Ch 5: Schrodinger Equation	Reading Quiz 2
7	Feb 23, 25, 27	Ch 5, continued	HW 5, due 2/25
8	Mar 2, 4, 6	Ch 6: Rutherford-Bohr Model of the Atom	HW 6, due 3/6
9	Mar 9, 11, 13	Ch. 7, Hydrogen Atom, Review for Test 2, Test 2	HW 7, due 3/11
-	Mar 16-20	**SPRING BREAK**	
10	Mar 23, 25, 27	Ch 8: Many-Electron Atoms, Ch. 9: Molecular Structure	HW 8, due 3/27
11	Mar 30, Apr 1, 3	Ch 9, continued	HW 9, due 4/3
12	Apr 6, 8, 10	Ch 11: Solid State Physics	HW 10, due 4/10
13	Apr 13, 15, 17	Review for Test 3, Test 3, Ch. 15: Cosmology	Reading Quiz 3
14	Apr 20, 22, 23	Ch 15: continued	HW 11, due 4/23
15	Apr 27	Final Exam Review	
16	May 4-8	Final Exam	

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations. If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal, and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu; (863) 874-8770; www.floridapoly.edy/disability.

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discuss resources and options available.

Academic Integrity

Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in sanctions up to and including expulsion from the university.

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action). *Recording class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is* ***prohibited****.*

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center**: The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).
    - **Knack Tutoring**: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com and sign in with your student account.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit floridapoly.edu/writing center.
- For more detail, visit https://floridapoly.edu/writingcenter.