



# Academic Learning Compact

## Physics

### Program Mission Statement

The mission of the Department of Physics is to provide excellent undergraduate education by offering courses in physics, astronomy, and earth science. Our students should gain an appreciation of the physical world and an understanding of scientific methods of inquiry.

Students will be challenged and assisted in the development of a working knowledge of physics as demonstrated by their ability to solve problems in physics and related fields. Examples of departmental support for students include hiring physics majors as graders, mentoring majors in research, and encouraging majors to work as tutors for ACE and the Society of Physics Students. These activities serve to strengthen the academic preparation of our majors.

The physics major consists of eight tracks: traditional physics, physics-material science, physics-electrical engineering, physics-mechanical engineering, physics-computing emphasis, physics-civil engineering, astrophysics, and pre-medical physics. In addition, the department offers a physics teaching option that consists of a major in physics combined with a minor in education. In addition, we encourage some of our majors to consider a minor in business in order to broaden their background. The department aspires to offer programs that instill in our students the principles, motivation, comprehension, and vision to prepare them for careers in physics and related fields and for intellectual growth throughout their lives. Toward these ends, the department seeks to focus its resources to develop curricula that inspire our students to gain a firm and operative understanding of fundamental ideas in physics and related fields, and to provide opportunities for faculty to mentor undergraduates in original research in theoretical, experimental, and computational physics. Examples of faculty scholarship that benefits our physics majors is the support by the College of Arts and Sciences and the department for 3 to 5 summer student research grants which support physics majors' summer research work under the mentorship of the physics faculty.

Faculty and staff engage in continuous assessment and improvement in order to ensure that the department most effectively achieves its goals.

The department will continue to seek to engage in new initiatives that impact the local, state, and international communities. Examples of our involvement in the community include: the UNF physics department's international exchange program with the University of Technology of Troyes, France; student internships and faculty interactions with several institutions such as, Mayo Clinic, Vistakon, and Saft Battery; physics participates in the Jacksonville Teacher Residency program in collaboration with the College of Education and Duval County Public Schools; the department sponsors a Physics Teaching Apprenticeship Program where upper-level physics majors are paid a stipend to assist a local high school physics teacher at such institutions as, e.g., Paxon School for Advanced Studies and Douglas Anderson School of the Arts.

Finally, the department offers a colloquium series that is an integral part of our "Introduction to Physics for New Majors" course in the fall semester and our "Physics Research and Seminar" capstone course offered to graduating seniors in the spring semester.

### Student Learning Outcomes

#### Graduates will be able

##### Content/Discipline-Specific Knowledge/Skills

- Apply a single principle of physics to solve simple quantitative problems.
- Demonstrate good understanding and retention of basic principles of physics in the core areas of physics: classical mechanics, electricity and magnetism, optics and waves, thermodynamics & statistical mechanics, and quantum mechanics.
- Perform laboratory experiments based on fundamental principles of physics that employ instrumentation commonly used by physicists.

##### Communication Skills

- Write in a clear, well-organized, and mechanically correct style appropriate to physics.
- Give an oral report to an audience of peers of work in physics that is organized well and presented clearly.

##### Critical Thinking Skills

- Combine principles of physics with appropriate mathematics to solve complex quantitative problems.
- Demonstrate the ability to conduct a literature search and organize bibliographic sources to support conclusions from their research in a style appropriate to physics. (assessed in the spring senior-level Physics Research & Seminar capstone course)

### **Assessment Approaches**

Direct and indirect measures of student learning are employed to assess mastery of the intended student learning outcomes.

We evaluate direct measures including:

- > student responses to questions on the Educational Testing Service's Major Field Test for Physics, thus addressing the physics Simple Problems SLO and the Complex Problems SLO. This exam is given each spring in our Physics Research and Seminar senior capstone course. The exam results will be reported annually.
- > a departmental examination has been developed and was for the first time administered in the Fall 2013 Modern Physics class taken by junior physics majors; the same exam will be administered in the senior capstone course (Physics Research and Seminar), thus addressing our Core Areas SLO. Going forward, the department exam will allow us to obtain both pre (in Modern Physics)- and post (capstone course)- test results for largely the same group of students.
- > written and oral reports are administered in our spring senior capstone (Physics Research and Seminar) course, thus addressing our Writing SLO and Speaking SLO. The student scores for these reports will be reported annually.
- > written laboratory reports and experiments in our fall Modern Physics Lab course address our Writing SLO and the Laboratory SLO. The student scores for these reports will be reported annually.

Indirect measures may include employer or alumni surveys, student perception surveys, job placement, and graduate school placement rates. The department maintains a file on the placement of all our graduates, whether they continue their studies in graduate or professional studies or seek immediate employment in industry or schools.