Core Curriculum Course Submission
Criteria: Science

1. General Information

a. Originating Person	b. Contact Person's E-mail	c. Contact Phone	d. Date
Al Adams	ajadams@ualr.edu	(501)554-3856	10/20/14

e. College/School	f. Department/Program
College of Arts, Letters, & Sciences	Physics & Astronomy

☒ **Submission Statement**
By submitting this form, we acknowledge our understanding that the Core Council has the authority to review approved courses to ensure they continue to meet the established goals and outcomes of that category of the core; that the Council has authority to develop a core assessment program; and that the Council will be developing review and assessment policies by the end of 2014. Further, we agree that if this course is approved, we will participate in the university-wide assessment of the core.

☒ **Chair and Dean Awareness**
Your department chairperson and college dean must be made aware of your submission for core. By submitting this form, you are acknowledging that this has occurred.

2. Course Information

a. Course ID	b. Current Title
PHYS 1322/PHYS 1122	College Physics II/College Physics II Laboratory

c. Catalog Description

Prerequisite PHYS 1321. Continuation of PHYS 1321, including topics of electricity, magnetism, electromagnetism, electromagnetic radiation, geometric and physical optics, and selected topics from modern physics, including radioactivity. Three hours lecture, one hour optional discussion. Three credit hours. Prerequisite concurrent: PHYS 1322. Two hours laboratory covering topics in PHYS 1322. Students explore concepts and principles using laboratory skills of inquiry, measurement techniques, mathematical analysis, graphing, and modeling. One credit hour.

d. How will your department ensure a level of consistency among sections of this course? Who will be responsible for this?

The Department of Physics and Astronomy has a standing Curriculum Committee charged with overseeing the introductory courses along with the associated laboratories. During the week prior to the beginning of each semester the departmental Curriculum Committee will meet with the instructors for the sections of PHYS 1322 and PHYS 1122 and review educational goals, the learning outcomes, the learning objectives, and the assignments that support the objectives and share the syllabi from previous semesters. During the first week of classes each semester the Curriculum Committee will review the course syllabus as created by the section instructors to make sure all the guidelines for Core Courses are being met.

Educational Goals	Learning Outcomes students will...	Learning Objectives: At the end of the course students will be able to...	Assignments	Explanation
Knowledge 1 – Concepts, methodologies, findings, and applications of mathematics and the social and natural sciences, engineering and technology.	1. understand the theoretical perspective used in one or more science discipline;	**Learning Objectives 1.1** Apply the principles and concepts of Newtonian, Statistical, and Quantum Mechanics that govern electricity and magnetism, electromagnetic radiation, optics, and modern physics including special relativity, atomic and nuclear physics.	**Assignments 1.1** Weekly quizzes, in-class exercises, periodic exams, online homework	**Explanation 1.1** Students review the text and hear a brief lecture about the various topics in introductory physics but the mastering of the concepts comes from active learning exercises and working problems. In working exercises in a team setting and solving problems either in a group setting or as individuals, students develop the knowledge and skills required to apply concepts to answer conceptual questions and find numerical solutions to specific physical scenarios.
	2. understand observational and experimental methods used in one or more of the sciences;	**Learning Objectives 1.2** Gather data, analyze data, model data, carry out error analysis, also design and carry out an original experiment that tests a hypothesis	**Assignments 1.2** Perform laboratories over the course of a semester, review the course content relevant for the laboratory, make measurements, model the data mathematically, write a report for each of the laboratories, do a post-laboratory assessment. Given a question to explore students will develop a hypothesis, design a measurement to test it, carry out the measurement, analyze and interpret the results.	**Explanation 1.2** Students experience firsthand the nature of science by making measurements and then using sound reasoning skills to interpret the data and form models that provide a useful way to think about the physical system. Students will be required to plan and implement a measurement to test a hypothesis, then carry out the measurement, then analyze and interpret their results in the context of the hypothesis.
	3. understand applications and limitations of the sciences;	**Learning Objectives 1.3** Distinguish the ways of knowing offered by science from other non-science ways of knowing; identify and quantify	**Assignments 1.3** Students will submit writing assignments devoted to the nature of science, identifying examples of current relevance that fall within	**Explanation 1.3** Science focuses on those aspects of knowledge that lend themselves to measurement and verification. Students should be able to

		the accuracy and precision of quantitative data as limiting factors in validating models and interpretations.	and outside the purview of science; students will include error analysis in their laboratory report.	distinguish topics which are valid scientific questions from those which are not. Students should also recognize that measurements and data are limited in accuracy.
Educational Goals	**Learning Outcomes students will...**	**Learning Objectives: At the end of the course students will be able to..**	**Assignments**	**Explanation**
Skills 1 – Communication	1. develop an understanding of how to communicate scientific procedures, results from the inquiry and conclusions resulting from applying the scientific method;	**Learning Objectives 1.1** Gather and organize data and the present experimental results and interpretations in a written format	**Assignments 1.1** In-class exercises, quizzes, laboratory exercises and reports, writing assignments on the nature of science	**Explanation 1.1** Weekly laboratory sessions, in addition to in-class exercises, will model the scientific method starting with hypothesis and ending with interpretation of results. Assignments require clear and adequately explained methods and results and conclusions and error analysis.
Educational Goals	**Learning Outcomes students will...**	**Learning Objectives: At the end of the course students will be able to...**	**Assignments**	**Explanation**
Skills 2 – Critical Thinking, Quantitative Reasoning, and Solving Problems Individually and Collaboratively	1. develop basic skills from the scientific method including inquiry, data collection, analysis, and interpretation in order to explore a scientific problem from hypothesis testing to formulating a conclusion based on the inquiry;	**Learning Objectives 2.1** Identify all the important aspects of a scientific experiment; demonstrate the ability to carry out all the important aspects of a scientific experiment	**Assignments 2.1** Carry out a laboratory exercise starting with hypothesis, then designing the experiment, then implementing the experiment, then analyzing the data, then making sound inferences from the data, then preparing a formal report describing each of the parts of the project	**Explanation 2.1** In the lecture course students will be asked to illustrate and characterize the scientific measurement process from hypothesis formation through published results. In the laboratory course students will actually model that process through at least one beginning or ending laboratory which illustrates the scientific process.
	2. learn about the world through observation and experimentation, through modeling and interpretation,	**Learning Objectives 2.2** Identify and model sound scientific experimentation and mathematical modeling of the	**Assignments 2.2** Carry out laboratories and perform in-class exercises which model the scientific	**Explanation 2.2** In the class students will given examples of the scientific process of gathering data, organizing and

	and through analysis and evaluation;	data	process of observation and experimentation and data analysis, developing an explanation and then testing it with further experiments.	presenting it is a clear and succinct manner. Students will master this process through repeated laboratory measurements and written laboratory reports.
Educational Goals	**Learning Outcomes students will...**	**Learning Objectives: At the end of the course students will be able to...**	**Assignments**	**Explanation**
Skills 3 – Information Technology	1. develop and apply technological tools for inquiry, analysis, and presentation of scientific information and data;	**Learning Objectives 3.1** Demonstrate the ability to use word processing and spreadsheet programs, in addition to the graphing calculator or computer mathematical software and electronic interfaces for laboratory measurements	**Assignments 3.1** In class exercises, special assignments, and laboratories reports, in addition to exams and quizzes	**Explanation 3.1** Computer programs that aid all aspects of the scientific process, especially data gathering, manipulation , and analysis and presentation will be a part of both the lecture and the laboratory experience
Educational Goals	**Learning Outcomes students will...**	**Learning Objectives: At the end of the course students will be able to..**	**Assignments**	**Explanation**
Values 1 – Personal Responsibility and Ethical Behavior	1. take responsibility for completing assignments in an ethical manner, working on one's own when required and acknowledging resources when used;	**Learning Objectives 1.1** Use programs that aid all aspects of the scientific process, especially data gathering, manipulation, and analysis and presentation.	**Assignments 1.1** On each quiz and exam requiring individual work, students sign a declaration statement that no help was provided by another person and no help was provided to another person; on all team projects and the writing assignments for the course identify and acknowledge all resources	**Explanation 1.1** By signing a declaration statement with each graded assignment students will be continually reminded of the ethical standards which govern our society
	2. develop an	**Learning Objectives 1.2**	**Assignments 1.2**	**Explanation 1.2**

	understanding of the ethical obligations in conducting research, and of being precise and accurate with data, including how this obligation applies to communication of information;	Understand what constitutes responsible conduct in research.	Read the most recent report from the National Academies "On being a Scientist: A Guide to Responsible Conduct in Research" and summarize its key points in writing assignments.	Advancement of scientific knowledge requires sound ethical conduct in research and all students of science should recognize what is expected of those who strive to advance science.

Educational Goals	Learning Outcomes students will...	Learning Objectives: At the end of the course students will be able to...	Assignments	Explanation
Values 2 – Civic Responsibility	1. develop an understanding of the ethical issues that may result when applying scientific knowledge that is incomplete.	**Learning Objectives 2.1** Understand and articulate the ethical societal issues which flow from existing states of knowledge	**Assignments 2.1** Writing assignment	**Explanation 2.1** Science courses traditionally do not devote teaching and learning time to questions of ethics and current texts don't include specific discussions of ethical questions. A written paper or an open response question on an exam will now require students in PHYS 1321/1121 to analyze the ethical implications of a current scientific question

Additional Comments:

Belinda Blevins-Knabe — Approved by Core Curriculum Committee — 10-27-14 — Date

Approved by Provost — 11/7/2014 — Date

Approved by Chancellor — 11/11/14 — Date