

Eastern Illinois University
Revised Course Proposal
PHY 1051G, Physics of the Modern World

Please check one: ☐ New course ☒ Revised course

PART I: CATALOG DESCRIPTION

1. **Course prefix and number, such as ART 1000:** PHY 1051G
2. **Title (may not exceed 30 characters, including spaces):** Physics of the Modern World
3. **Long title, if any (may not exceed 100 characters, including spaces):**
4. **Class hours per week, lab hours per week, and credit [e.g., (3-0-3)]:** 3-0-3
5. **Term(s) to be offered:** ☐ Fall ☐ Spring ☐ Summer ☒ On demand
6. **Initial term of offering:** ☐ Fall ☒ Spring ☐ Summer **Year:**
7. **Course description:** An introduction to some of the revolutionary ideas of modern physics, such as quantum theory, atomic and nuclear physics, Einstein's theory of relativity, the Heisenberg uncertainty principle, operation and applications of lasers and other modern technology. These and other topics may be discussed at the discretion of the instructor. P1 901
8. **Registration restrictions:**
 - a. **Equivalent Courses**
 - **Identify any equivalent courses** (e.g., cross-listed course, non-honors version of an honors course).
 - Indicate whether coding should be added to Banner to restrict students from registering for the equivalent course(s) of this course. ☐ Yes ☐ No
 - b. **Prerequisite(s)**
 - **Identify the prerequisite(s)**, including required test scores, courses, grades in courses, and technical skills. Indicate whether any prerequisite course(s) MAY be taken concurrently with the proposed/revised course. None
 - Indicate whether coding should be added to Banner to prevent students from registering for this course if they haven't successfully completed the prerequisite course(s). ☐ Yes ☐ No

If yes, identify the minimum grade requirement and any equivalent courses for each prerequisite course:
 - c. **Who can waive the prerequisite(s)?**
☐ No one ☐ Chair ☐ Instructor ☐ Advisor ☐ Other (Please specify)
 - d. **Co-requisites** (course(s) which MUST be taken concurrently with this one):
 - e. **Repeat status:** ☒ Course may not be repeated.
☐ Course may be repeated once with credit.

Please also specify the limit (if any) on hours which may be applied to a major or minor.

- f. **Degree, college, major(s), level, or class** to which registration in the course is restricted, if any: None
- g. **Degree, college, major(s), level, or class** to be excluded from the course, if any: None
9. **Special course attributes** [cultural diversity, general education (indicate component), honors, remedial, writing centered or writing intensive] General Education (scientific awareness), writing-active
10. **Grading methods** (check all that apply): ☒ Standard letter ☐ CR/NC ☐ Audit ☐ ABC/NC
("Standard letter"—i.e., ABCDF—is assumed to be the default grading method unless the course description indicates otherwise.)

Please check any special grading provision that applies to this course:

- ☐ The grade for this course will not count in a student's grade point average.
- ☐ The credit for this course will not count in hours towards graduation.

If the student already has credit for or is registered in an equivalent or mutually exclusive course, check any that apply:

- ☐ The grade for this course will be removed from the student's grade point average if he/she already has credit for or is registered in _____ (insert course prefix and number).
- ☐ Credit hours for this course will be removed from a student's hours towards graduation if he/she already has credit for or is registered in _____ (insert course prefix and number).

11. Instructional delivery method: (Check all that apply.)

- ☒ lecture ☐ lab ☐ lecture/lab combined ☐ independent study/research
☐ internship ☐ performance ☐ practicum or clinical ☐ study abroad
☒ Internet ☐ hybrid ☐ other (Please specify)

PART II: ASSURANCE OF STUDENT LEARNING

1. List the student learning objectives of this course:

In successfully completing this course, students will:

- A. Use scientific terminology, which will make them a more informed electorate.
- B. Be able to apply the physical principles underlying modern technology.
- C. Research and write essays on topics related to course material.
- D. Analyze and solve numerical problems related to course material.
- E. Discuss some of the cutting edge issues today in physical science, such as creation and shape of the universe, the fundamental ideas of space and time, what are the fundamental constituents of matter, how do theories of science arise and how are they tested.

Students will also:

- F. Communicate the concepts of quantum mechanics and of the special and general theories of relativity.
- G. Apply problem-solving techniques and solve numerical problems in physics and in other areas of science.

- a. If this is a general education course, indicate which objectives are designed to help students achieve one or more of the following goals of general education and university-wide assessment:
 - EIU graduates will write and speak effectively. (C, E, F, and G)
 - EIU graduates will think critically. (B, C, D, E, and G)
 - EIU graduates will function as responsible citizens. (A, B, E, and F)
 - b. If this is a graduate-level course, indicate which objectives are designed to help students achieve established goals for learning at the graduate level:
 - Depth of content knowledge
 - Effective critical thinking and problem solving
 - Effective oral and written communication
 - Advanced scholarship through research or creative activity
2. Identify the assignments/activities the instructor will use to determine how well students attained the learning objectives:

Learning Objectives	Homework assignments	Tests and Quizzes	Final Exam
Use scientific terminology, which will make them a more informed electorate.	X	X	X
Be able to apply the physical principles underlying modern technology.	X	X	X
Analyze and solve numerical problems related to course material.	X	X	X
Research and write essays on topics related to course material.	X	X	X
Discuss some of the cutting edge issues today in physical science, such as creation and shape of the universe, the fundamental ideas of space and time, what are the fundamental constituents of matter, how do theories of science arise and how are they tested.	X	X	X
Apply problem solving techniques and solve numerical problems in physics and other areas of science.	X	X	X
Communicate the concepts of quantum mechanics and	X	X	X

of the special and general theories of relativity.			
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3. **Explain how the instructor will determine students' grades for the course:** The grading scale for the course will be: 86-100% = A, 70-85% = B, 60-69% = C, 50-59% = D, and 49% or less = F.

HOMEWORK	20%
QUIZZES	20%
TEST # 1	20%
FINAL	25%
ATTENDANCE/ONLINE ACTIVITIES	15%

4. **For technology-delivered and other nontraditional-delivered courses/sections, address the following:**
- Describe how the format/technology will be used to support and assess students' achievement of the specified learning objectives:** For the online version of the course the student assessments will be based on homework assignments, online exams, short writing assignments, and a final. The students will be encouraged to actively engage in synchronous and asynchronous online discussions.
 - Describe how the integrity of student work will be assured:** Assignments can be accessed at certain dates and must be finished within the precise time intervals (90, 120, or 150 minutes). The same assignment may present different problems to different students since some numerical questions can be generated with different data sets and are offered to students on a random basis. Turnitin or other anti-plagiarism services will be used to screen writing assignments. The syllabus will clearly cite academic integrity expectations.
 - Describe provisions for and requirements of instructor-student and student-student interaction, including the kinds of technologies that will be used to support the interaction (e.g., e-mail, web-based discussions, computer conferences, etc.):** The instructor-student communication will be based on e-mail, telephone, video conferencing, and other web based interactions such as Skype or Elluminate. The course announcements will be posted on the course webpage. A discussion board will be available for course specific discussions.
5. **For courses numbered 4750-4999, specify additional or more stringent requirements for students enrolling for graduate credit. These include:**
- course objectives;
 - projects that require application and analysis of the course content; and
 - separate methods of evaluation for undergraduate and graduate students.
6. **If applicable, indicate whether this course is writing-active, writing-intensive, or writing-centered, and describe how the course satisfies the criteria for the type of writing course identified. (See Appendix *.)**
- The course is writing active since students will be required to complete frequent, brief writing activities and assignments. Exams and assignments include essays questions.

PART III: OUTLINE OF THE COURSE

Provide a week-by-week outline of the course's content. Specify units of time (e.g., for a 3-0-3 course, 45 fifty-minute class periods over 15 weeks) for each major topic in the outline. Provide clear and sufficient details about content and procedures so that possible questions of overlap with other courses can be

addressed. For technology-delivered or other nontraditional-delivered courses/sections, explain how the course content “units” are sufficiently equivalent to the traditional on-campus semester hour units of time described above. For the in class session there are about 150 minutes per week of class time to cover the topics and other class activities. For the online version of the course the topics will be covered with powerpoint presentations as well as readings and video links.

Course outline:

- Week 1: Systems of measurement
 Scientific method
 Inertia
 Online – synchronous class meeting
- Week 2: Newton’s 1st Law
 Velocity and acceleration
 Quiz
- Week 3: Newton’s 2nd Law
 Mass, weight, and free fall
 Newton’s 3rd Law
- Week 4: Vectors
 Impulse and momentum
 Work and energy
 Quiz
- Week 5: Newton’s theory of gravitation
 Applications of Newtonian gravity
- Week 6: Einstein’s theory of gravitation
 Atomic nature of matter
 Quiz
 Online – synchronous class meeting/review session
- Week 7: Vibrations and waves
 Properties of light
 Wave nature of light
 Exam
- Week 8: Light interference and polarization
 Light emission by atoms
 Fluorescence, phosphorescence, and lasers
- Week 9: Quantum nature of light
 Uncertainty and complementarity
 Quiz

- Week 10: Quantum theory of the atom
Nuclear physics
Radioactivity
- Week 11: Nuclear fission and fusion
Applications of nuclear physics
Quiz
- Week 12: Einstein's special theory of relativity
Spacetime and time dilation
Length contraction and mass/energy equivalence
- Week 13: Einstein's general theory of relativity
Consequences of general relativity
Quiz
- Week 14: Additional topics in modern physics
Online – synchronous class meeting
- Week 15: Additional topics in modern physics
Online – synchronous class meeting/review session
- Final Exam

PART IV: PURPOSE AND NEED

- 1. Explain the department's rationale for developing and proposing the course.** This is a revision of an existing course.

a. If this is a general education course, you also must indicate the segment of the general education program into which it will be placed, and describe how the course meets the requirements of that segment.

This course will be placed in the physical science component of the scientific awareness segment of the general education program. The course meets the requirement of that segment since students in this course must:

- i. Analyze homework and exam problems and synthesize solutions by applying the appropriate set of physical and mathematical concepts.
- ii. Identify and use the appropriate physical and mathematical laws to quantifiably explain phenomena that occur in the natural world.

b. If the course or some sections of the course may be technology delivered, explain why. This course may be technology delivered to add accessibility to the course. This is true both from a student as well as a faculty point of view.

2. **Justify the level of the course and any course prerequisites, co-requisites, or registration restrictions.** This course could be taken as a first physics course, and requires mathematics only at the level of simple algebra, and is therefore, appropriately, a freshman level course. There are no prerequisites.
3. **If the course is similar to an existing course or courses, justify its development and offering.**
 - a. **If the contents substantially duplicate those of an existing course, the new proposal should be discussed with the appropriate chairpersons, deans, or curriculum committees and their responses noted in the proposal.** This proposal will add an online delivery option to a course that was otherwise approved in 2000.
 - b. **Cite course(s) to be deleted if the new course is approved. If no deletions are planned, note the exceptional need to be met or the curricular gap to be filled.** This course neither adds nor deletes any course from the curriculum because it is a revision of an existing course.
4. **Impact on Program(s):**
 - a. **For undergraduate programs, specify whether this course will be required for a major or minor or used as an approved elective.** This course is not required for any major.
 - b. **For graduate programs, specify whether this course will be a core requirement for all candidates in a degree or certificate program or an approved elective.**

If the proposed course changes a major, minor, or certificate program in or outside of the department, you must submit a separate proposal requesting that change along with the course proposal. Provide a copy of the existing program in the current catalog with the requested changes noted.

PART V: IMPLEMENTATION

1. **Faculty member(s) to whom the course may be assigned:** All qualified faculty members in the Physics Department may be assigned to teach this course.

If this is a graduate course and the department does not currently offer a graduate program, it must document that it employs faculty qualified to teach graduate courses.

2. **Additional costs to students:** There will be no additional cost to the student.

Include those for supplemental packets, hardware/software, or any other additional instructional, technical, or technological requirements. (Course fees must be approved by the President's Council.)

3. **Text and supplementary materials to be used (Include publication dates):**

Hewitt
CONCEPTUAL PHYSICS, 11TH Edition
2010
ISBN: 9780321568090

PART VI: COMMUNITY COLLEGE TRANSFER

If the proposed course is a 1000- or 2000-level course, state either, "A community college course may be judged equivalent to this course" OR "A community college course will not be judged equivalent to this course." A community college course will not be judged equivalent to a 3000- or 4000-level course but may be accepted as a substitute; however, upper-division credit will not be awarded. A community college course may be judged equivalent to this course.

PART VII: APPROVALS

Date approved by the department or school: 3/19/12

Date approved by the college curriculum committee: 3/23/12

Date approved by the Honors Council (*if this is an honors course*):

Date approved by CAA: 4/5/12

*In **writing-active courses**, frequent, brief writing activities and assignments are required. Such activities -- some of which are to be graded -- might include five-minute in-class writing assignments, journal keeping, lab reports, essay examinations, short papers, longer papers, or a variety of other writing-to-learn activities of the instructor's invention. Writing assignments and activities in writing-active courses are designed primarily to assist students in mastering course content, secondarily to strengthen students' writing skills. In **writing-intensive courses**, several writing assignments and writing activities are required. These assignments and activities, which are to be spread over the course of the semester, serve the dual purpose of strengthening writing skills and deepening understanding of course content. At least one writing assignment is to be revised by the student after it has been read and commented on by the instructor. In writing-intensive courses, students' writing should constitute no less than 35% of the final course grade. In **writing-centered courses** (English 1001G, English 1002G, and their honors equivalents), students learn the principles and the process of writing in all of its stages, from inception to completion. The quality of students' writing is the principal determinant of the course grade. The minimum writing requirement is 20 pages (5,000 words).

Student
Success
Center

<http://www.eiu.edu/~success/>

581-6696



<http://www.eiu.edu/~counsctr/>

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