**Program: Physics**

| | Goals | Objectives | Data | Analysis | Feedback | Changes |
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| 1 | Students will have a knowledge of questions that faced great scientists of the past and will have an understanding of ways scientists have explained the universe in which we live, including the evolution of these ideas and the generation of new paradigms. | 1A. Students will explain how science and scientists have asked questions and have drawn conclusions about natural phenomena. | Rubric for Papers in Dept. Seminar course | Data has not been analyzed | | |
| 2 | Students will understand the role of experiment in physics. | 2A. Students will articulate the role of theoretical models in the explanation of physical phenomena. | Rubric for Papers in Dept. Seminar course | Data has not been analyzed | | |
| | | 2B. Students will give examples of the interplay of experiment and theory in physics. | Rubric for Papers in Dept. Seminar course | Data has not been analyzed | | |
| 3 | Students will understand how physics fits into the broader context of a liberal education. | 3A. Students can articulate the role of physics in their search for an understanding of the world in which they live. | Mock interview in Engineering Seminar | Data has not been collected | | |

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| | | 3B. Students can articulate the relevance of the knowledge of the world obtained through physics as it pertains to other disciplines. | Mock interview in Engineering Seminar | Data has not been collected | | |
| | | 3C. Students will be able to apply physics reasoning as one of the possible tools in areas other than physics. | Mock interview in Engineering Seminar | Data has not been collected | | |
| 4 | IV. Students will have a knowledge of the information in each of the major areas of physics, and of the interrelation between these major areas of physics. | 4A. Students will demonstrate a basic understanding of the fundamental concepts in each of the major areas of physics: mechanics, thermodynamics, optics, electromagnetism and quantum mechanics. | Pre- and post-test data on national assessment exams has been collected for many years in General Physics. Pre- and post-test data on departmental assessment exams (based onf the Physics GRE) has been collected for several years in upper-division core Physics courses. | Normalized gains are calculated for General Physics assessments, and compared with the departmental and national average. Final scores on departmental assessments are compared with departmental and national averages for GRE-takers (a different audience, possibly more advanced than our majors). | Discuss annually in department meeting, and in planning meetings for General Physics. Normalized gains are generally above the national average. Final scores in upper-division courses are generally near the aveage of GRE-takers. More interactive classes tend to have higher scores. | Individual instructors have made efforts to make classes more interactive. |

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| | 4B. Students will articulate ways in which the major areas of physics influence each other. | Pre- and post-test data on departmental assessment exams (based onf the Physics GRE) has been collected for several years in Physics in Medicine, Nuclear Physics, Solid State Physics, Cosmology, Laser physics, etc. | Final scores on departmental assessments are compared with departmental and national averages for GRE-takers (a different audience, possibly more advanced than our majors). | Discuss annually in department meeting. Final scores in upper-division courses are generally near the aveage of GRE-takers. More interactive classes tend to have higher scores. | Individual instructors have made efforts to make classes more interactive. |
| | 4C. Students will be able to use concepts and techniques from more than one area of physics together to solve problems. | Pre- and post-test data on departmental assessment exams (based onf the Physics GRE) has been collected for several years in Physics in Medicine, Nuclear Physics, Solid | Final scores on departmental assessments are compared with departmental and national averages for GRE-takers (a different audience, possibly more advanced than our majors). | Discuss annually in department meetings. | More interactive classes tend to have higher scores; individual instructors have made efforts to make classes more interactive. |

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| 5 | Students will have mastered the skills appropriate to the discipline of physics. | 5A. Students will demonstrate a conceptual problem solving ability. | Pre- and post-test data on national assessment exams has been collected for many years in General Physics. | Normalized gains are calculated for General Physics assessments, and compared with the departmental and national average. | Discuss annually in department meetings. | More interactive classes tend to have higher scores; individual instructors have made efforts to make classes more interactive. |
| | | 5B. Students will demonstrate a proficiency in the use of mathematics. | National assessment exams given in General Physics and departmental assessment exams in upper-division courses | Final scores on departmental assessments are compared with departmental and national averages for GRE-takers (a different audience, possibly more advanced than our majors). | Discuss annually in department meetings. | More interactive classes tend to have higher scores; individual instructors have made efforts to make classes more interactive. |
| | | 5C. Students will demonstrate a proficiency in the design, measurement and analysis techniques required in the laboratory. | Pre-and post-test data has been collected for several years in competency exams in Modern Physics and Optics Laboratories. | Initial pass rates, final pass rates, and number of times to pass are tabulated. | Discuss annually in departmental meetings. | Instruction has been targeted to emphasize the basic compentencies in the context of the courses. |

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| 5D. Students will demonstrate a proficiency in the use of computers. | Pre-and post-test data has been collected for several years in competency exams in Modern Physics and Optics Laboratories. | Initial pass rates, final pass rates, and number of times to pass are tabulated. | Discuss annually in departmental meetings. | Instruction has been targeted to emphasize the basic compentencies in the context of the courses. |
| 5E. Students will demonstrate a proficiency in communication through library research, technical writing, and oral presentations. | Peer evaluation in seminar | Data has not been analyzed | | |
| 5F. Students will demonstrate the ability to teach and to explain science. | Peer evaluation in seminar | Data has not been analyzed | | |
| 5G. Students will demonstrate the ability to work as members of a team. | successful laboratory work, research collaborations | Data has not been analyzed | | |

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| | | 5H. Interested students will be well prepared for graduate study in physics. | Acceptance rate into graduate study; survey of graduates | percent of majors accepted into graduate and professional schools is calculated; student comments about their perception of their preparatin are collected | Discussed annually in departmental meetings. ~100% acceptance into some a program for those interested (~ 45% go into physics or engineering grad school). | Student manual for preparation for graudate school is being developed. Faculty-moderated study groups for the subject GRE have been discussed. |
| 6 | Students will understand the value of ethical action, both in their personal lives and in their professional lives. | 6A. Students will successfully analyze the ethical component of various situations with a scientific dimension. | Rubric for reflection paper on ethics presenation in departmental seminar; | Data has not been analyzed | | |
| | | 6B. Students will investigate controversial issues that have implications from the physical sciences. | | Data has not been analyzed | | |
| 7 | Students will understand the ongoing process of developing scientific knowledge through research. | 7A. Students will be able to work independently and collaboratively on open-ended questions. | Rubric for project in Optics lab; student research participation | percent of majors participating in independent research is calculated | ~100% research participation for physics majors | |

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| 7B. Students will be able to name and describe some topics of current research interest in physics. | Rubric for Papers in Dept. Seminar course | Data has not been analyzed |
| 7C. Students will synthesize current knowledge and apply or extend it to new situations. | Departmental seminar each semester; occasional research presentations | Data has not been analyzed |

University and College Assessment Goals

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| **University Goals** | 1. A Creighton graduate will demonstrate disciplinary competence and/or professional proficiency. | 2. A Creighton graduate will demonstrate critical thinking skills. | 3. A Creighton graduate will demonstrate a disposition to service and engaged civic responsibility. | 4. A Creighton graduate will demonstrate an ability to communicate clearly and effectively in written and oral forms. | 5. A Creighton graduate will demonstrate a disposition toward life long learning. | 6. A Creighton graduate will demonstrate cultural competence, enabling effective work across racial, ethnic and cultural lines. | |
| **College Goals** | 1. Communicate clearly and effectively in written, spoken, mathematical, and artistic languages. | 2. Think critically about information, assumptions, and arguments found in multiple forms of academic and cultural discourse. | 3. Integrate broad and diverse learning with at least one individually chosen discipline or professional field. | 4. Know the Christian, Catholic, and Jesuit intellectual traditions in the context of historical, cultural and spiritual concerns. | 5. Apply a reasoned approach to effective decision-making according to sound and coherent ethical principles. | 6. Relate an active commitment to learning, truth, and justice to a life of service and to the development of the global Community. | 7. (Demonstrate an understanding of the diversity of human identities and cultures in the United States and around the world) |
| **Program Goals 1** | | Students will have a knowledge of questions that faced great scientists of the past and will have an understanding of ways scientists have explained the universe in which we live, including the evolution of these ideas and the generation of new paradigms. | Students will have a knowledge of questions that faced great scientists of the past and will have an understanding of ways scientists have explained the universe in which we live, including the evolution of these ideas and the generation of new paradigms. | | | | |
| **Program Goals 2** | | | Students will understand the role of experiment in physics. | | | | |
| **Program Goals 3** | | Students will understand how physics fits into the broader context of a liberal education. | Students will understand how physics fits into the broader context of a liberal education. | Students will understand how physics fits into the broader context of a liberal education. | | | |
| **Program Goals 4** | | | Students will have a knowledge of the information in each of the major areas of physics, and of the interrelation between these major areas of physics. | | | | |
| **Program Goals 5** | Students will have mastered the skills appropriate to the discipline of physics. | Students will have mastered the skills appropriate to the discipline of physics. | Students will have mastered the skills appropriate to the discipline of physics. | | Students will have mastered the skills appropriate to the discipline of physics. | | |

**Program Goals 6**

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| understand the value of ethical action, both in their personal lives and in their professional lives. | Students will understand the value of ethical action, both in their personal lives and in their professional lives. |