

WINONA STATE UNIVERSITY
GENERAL EDUCATION PROGRAM APPROVAL FORM

Routing form for General Education Program Course approval.

Course Physics 141

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|---|---------------------------|---|
| Department Approval | | |
| <u>Andrew J. Ferstl</u> Department Chair | <u>2013-10-31</u> Date | <u>aferstl@winona.edu</u> e-mail address |
| Dean's Recommendation <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No* | | |
| <u>Charles Smutchn</u> Dean of College | <u>10/31/13</u> Date | |
| *If the dean does not approve the proposal, a written rationale should be provided to the General Education Program Subcommittee. | | |
| GEPS Recommendation <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved | | |
| <u>[Signature]</u> Chair, General Education Program Subcommittee | <u>11/13/13</u> Date | |
| A2C2 Recommendation <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved | | |
| <u>[Signature]</u> Chair of A2C2 | <u>11/20/13</u> Date | |
| Faculty Senate Recommendation <input type="checkbox"/> Approved <input type="checkbox"/> Disapproved | | |
| _____ President of Faculty Senate | _____ Date | |
| Academic Vice President Recommendation <input type="checkbox"/> Approved <input type="checkbox"/> Disapproved | | |
| _____ Academic Vice President | _____ Date | |
| Decision of President <input type="checkbox"/> Approved <input type="checkbox"/> Disapproved | | |
| _____ President | _____ Date | |
| Please forward to Registrar. | | |
| Registrar | _____ Date entered | Please notify department chair via e-mail that curricular change has been recorded. |

[Revised 10-22-12]

5 11/7/13

WINONA STATE UNIVERSITY
PROPOSAL FOR GENERAL EDUCATION PROGRAM COURSES

Department _____

Date _____

Course No. _____ Course Name _____ Credits _____

Prerequisites _____

GEP Goal Area(s):*

CORE GOAL AREAS

- _____ Goal 1: Communication
- _____ Goal 3: Natural Science
- _____ Goal 4: Mathematics/Logical Reasoning
- _____ Goal 5: History and the Social and Behavioral Sciences
- _____ Goal 6: The Humanities and Fine Arts

THEME GOAL AREAS

- _____ Goal 7: Human Diversity
- _____ Goal 8: Global Perspective
- _____ Goal 9: Ethical and Civic Responsibility
- _____ Goal 10: People and the Environment

* Courses may be submitted for up to two Goal Areas.

Additional Requirement Categories (list number of credits desired in appropriate category):

_____ Intensive:

- _____ 1. Writing
- _____ 2. Oral Communication
- _____ 3a. Mathematics/Statistics
- _____ 3b. Critical Analysis

_____ Physical Development and Wellness

Provide information as specified in the previous directions.

Attach a ***General Education Program Approval Form***.

Department Contact Person for this Proposal:

Name (please print)

Phone

e-mail address

[Revised 9-6-11]

Course outline

1. Energy and Power and the Physics of Explosions
 - a. Types of Energy
 - b. Units of Energy
 - c. Sources of Energy, Overview
 - d. Explosions and Energy
 - e. Power
2. Atoms and Heat
 - a. Atoms and Molecules and the Meaning of Heat
 - b. Temperature and absolute zero
 - c. Law of Expansion
 - d. Laws of Thermodynamics
 - e. Efficiency
3. Gravity, Force, and Space
 - a. The Force of Gravity
 - b. Newton's 3rd Law
 - c. Orbiting Earth and Weightlessness
 - d. Escape to Infinity
 - e. Air Resistance and Fuel Efficiency
 - f. Momentum
 - g. Rockets
 - h. Airplanes, Helicopters, and Fans
 - i. Convection – Thunderstorms and Heaters
4. Nuclei and Radioactivity
 - a. Types of Radiation
 - b. Medical radiation
 - c. Fission
 - d. Fusion
5. Chain Reactions, Nuclear Reactors, and Atomic Bombs
 - a. Chain Reactions
 - b. Nuclear Weapons Basics
 - c. Nuclear Reactors
 - d. Nuclear Waste
6. Electricity and Magnetism
 - a. What is Electricity? What is Magnetism?
 - b. Electric Power
 - c. Electric and Magnetic Fields
 - d. Electromagnets
 - e. Electric Motors
 - f. Electric Generators
 - g. Transformers
 - h. Magnetic Levitation
 - i. AC versus DC
7. Waves and UFOs
 - a. What are waves
 - b. Sound
 - c. Longitudinal and Transverse waves
 - d. Waves used for communication and detection
 - e. Earthquakes
 - f. Reflection and refraction
8. Light
 - a. What is light
 - b. Light and technology
 - c. Color
 - d. Images
 - e. Mirrors
 - f. Lenses
 - g. Eyes
 - h. Telescopes and Microscopes
 - i. Spreading light – Diffraction
 - j. Holograms

- k. Polarization
- 9. Invisible Light
 - a. Infrared Radiation and technology
 - b. UV – “black lights”
 - c. The Ozone Layer
 - d. Electromagnetic Radiation and Spectrum
 - e. Medical Imaging
- 10. Climate Change
 - a. Earth’s temperature history
 - b. The greenhouse effect and greenhouse gases
 - c. Alternative energy solutions and conservation
- 11. Quantum Physics
 - a. Electron waves
 - b. Lasers
 - c. The Photoelectric Effect
 - d. Semiconductors and technology
 - e. Superconductors
 - f. Electron Microscope
 - g. Quantum Computers

| GEP Learning Outcome/Competency | Learning Opportunity | Assessment Method |
|--|---|---------------------------------------|
| Demonstrate understanding of scientific theories | Students will engage in several activities each week giving them the opportunity to refine their understanding of scientific theories and how they can be used to guide policy decisions. | Exams and project reports |
| Communicate their experimental findings, analyses, and interpretations | Writing a report following the format of scientific disciplines for a variety of audiences from policy makers to the general public. Students will also engage with their peers as they review drafts of their reports and assignments | Project report and weekly assignments |
| Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies | Students will be asked to identify main science concepts in societal issues based on weekly readings/case studies. They will need to identify the assumptions made in proposed solutions to the societal issues and what their scientific basis is. | Weekly Assignments and Exams |
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| Discern patterns and interrelationships of bio-physical and socio-cultural systems | Weekly activities will present evidence allowing students to extract patterns in bio-physical systems which will lead to the development of scientific theories/models. | Weekly Homework with case studies |
| Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions | Through weekly practice and assignments, students will practice identifying the limited resources available to solve issues and how using resources in one area will have an impact on other places. | Project report and Exams |
| Articulate and defend the actions they would take on various environmental issues | When students are preparing project reports, they will be required to discuss their drafts with their peers as well as the instructor. This will make them articulate and defend their decisions about how | Project report and Exams |

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| | they would solve particular social and environmental issues | |
| Propose and assess alternative solutions to environmental problems | On a weekly basis, scientific theories will be used to evaluate proposed solutions to relevant socio-cultural case studies (e.g. cases when science can guide policy making decisions). Students will need to explain the pros and cons of all the solutions being presented to judge their possible efficacy. | Weekly Homework |