Application for General Education Course Certification

Date: __________ 12/6/2009 __________

Course Prefix/Number/Title: PHY-100 Energy and Society

Course has been approved by the Faculty Senate for inclusion in the BCC Catalog: Yes √ No __________

Sponsor of Proposal: __________
Discipline/Department: __________

Discipline Coordinator: __________

Department Head: __________

Divisional Dean: __________

General Education Area/Discipline: Natural Sciences/Physics

General Education Area/Discipline:
1. Communication
2. Humanities: Arts & Media; History; Literature; Philosophy & Religion; World Languages & Cultures
3. Mathematics & Computer Science
4. Natural Sciences: Biology; Chemistry; Earth Science; Physics
5. Social Sciences: Anthropology; Economics, Geography; Political Science; Psychology; Sociology
6. Wellness & Exercise Science

Complete Catalog Description (including lecture hours, lab hours, credits, prerequisites, co-requisites):
This course provides an overview of the nature of energy, its uses, and its effect on the individual, society and the environment. The course will explore the use of energy in contemporary society and the development of renewable energy technologies. Emphasis is placed on conservation, energy efficiency, renewable energy sources and technologies that can be utilized to create a sustainable energy society. The laboratory part of the course will involve service learning projects.
3 lectures, 3 labs, 4 credits
Pre or Co-requisite(s): MAT-011

Please attach a Course Syllabus. (This must comply with the General Education Syllabus Guidelines adopted by the Faculty Senate on 3/11/03.)

Additional resources needed upon general education course certification (faculty, staff, equipment, space, library resources, costs, etc.). Please explain on an attached sheet. If none, check here: √

Expected date of implementation: __________ Spring 2010 __________

General Education Committee Action / Course Approved: Yes______ No______ Date: __________

Comments:
Comments Concerning
Application for General Education Course Certification
for PHY-100 Energy and Society

Joseph M. Sivo
12/6/2009

A) Motivation for Seeking General Education Status:

Most members of modern society are attuned to the current energy and environmentally related problems facing civilization and have become accustomed to the mantras of “sustainability” and “green” decision making. In the U.S., such worthy causes are thrust upon a public that has little general knowledge of either the physics of what exactly energy is, or how it is generated, transformed, transmitted, and consumed. Also, although, somewhat aware of the existence of the political, economic, and social consequences of energy use, the details of such are lacking to affect informed decision making. Detailed understanding of the science behind the daily conscious and unconscious energy decisions is largely absent. This course is designed to address these deficiencies. The robustness, well-being and health of this nation, the countries of the world and the environment rests with the public’s competence in the understanding of energy and its relation to society. For the students taking this course, it is an intended outcome that they acquire a sufficiently general education of all aspects of energy and its relation to society so that in their daily lives they become competent at affecting sound energy decisions and policy.

By approving General Education status for PHY-100 Energy and Society, Bergen Community College has the opportunity to lead the way in the state of New Jersey in being a model for sound energy education for the other community colleges.

B) Relation of PHY-100 Energy and Society to other Physics Courses at Bergen Community College:

There is currently a selection of General Education courses in the General Education Area of Natural Science and Discipline of Physics. These include:

PHY-111 Astronomy - Here, the laws of physics are learned and applied in an attempt to the understand contents and processes of the celestial universe.

PHY-113 Geology - Here, the laws of physics are learned and applied in an attempt to understand the contents and processes of the Earth’s solid surface and interior.
PHY- 112 Climatology – Here, the laws of physics are learned and applied in an attempt to understand the factors and processes dictating Earth’s global and regional climate.

PHY- 185 Intro to Physics – Here, the laws of physics are learned and applied in an attempt to understand the contents and processes of the natural and man-made material world.

In PHY-100 Energy and Society, the laws of physics are learned and applied in an attempt to understand the forms of energy in the natural world and their transformation and use in man-made modern society.

C) How PHY-100 Addresses the “Standards for General Education Courses at Bergen Community College”

The following lists the standards for General Education Courses at Bergen Community College as stipulated on the General Education website [http://www.bergen.edu/GENED/GEcourse_standards_7.pdf](http://www.bergen.edu/GENED/GEcourse_standards_7.pdf) along with some detailed examples of how the PHY-100 course addresses these standards. Please consult the course syllabus, the course text, or course content for confirmation.

1. A course proposed for general education certification at Bergen Community College must fit within one of the following six areas of study: (Communication, Humanities, Mathematics and Computer Science, Natural Sciences, Social Sciences, Wellness & Exercise)

   The PHY-100 course fits within the area of Natural Science as it is a study of the physics of energy.

2. A course proposed for general education certification at Bergen Community College must provide students with the opportunity to develop writing and critical thinking skills through a variety of appropriate critical thinking and writing assignments

   The PHY-100 course requires written scientific laboratory reports.

   The PHY-100 course requires a term paper on the physics of a particular energy source as well as its political, economic, environmental and social consequences.

   The PHY-100 course requires several essays requiring critical thinking throughout the semester. One includes a quantitative analysis of the effect of specific major political and social events on the time history of oil prices. Another essay includes a quantitative analysis of the overall efficiency of fuel cells and whether or not it is sound competent policy for the government to provide incentives for their adoption by the public for transportation.
3. The following list of fourteen propositions describes key characteristics of a general education course. A course proposed for general education certification at Bergen Community College must meet the criteria set forth in propositions 1 through 6, plus the criteria stated in at least four of the remaining propositions 7 through 14.

**Basic Characteristics**

1. A general education course is broad, introductory, and foundational in its field.

   The PHY-100 course covers the quantitative and qualitative physics of energy from source to transportation to transformation to transmission to consumption to waste. The history, economics, politics, and environmental consequences are discussed throughout.

2. A general education course does not presuppose the student's command of highly technical/specialized language, concepts, knowledge, or skills.

   The PHY-100 course presupposes only the mathematics of MAT-011. The language of physics and energy is developed as the course proceeds. The necessary mathematics for the course is reviewed and developed in the first laboratory exercise.

3. A general education course is not "specialized education," which prepares students for particular occupations or specific professional responsibilities. It does not focus narrowly on those skills, techniques, and procedures specific to a particular occupation or profession.

   The PHY-100 course is not intended to training students for a particular occupation. The knowledge gained in this course can be used throughout their daily lives to make for example, among many other things, wise energy choices.

4. A general education course covers one or more of the subjects typically required of educated persons that form the shared intellectual heritage of our diverse culture.

   The PHY-100 course discusses the science, history, politics, and economics of energy. Energy use is ubiquitous among all cultures. This course examines energy use from antiquity to present, including energy use among Western and non-Western cultures.

5. A general education course is general, i.e., not focused upon "majors" or academic and vocational specializations. Its object is "common learning," based upon those realities, experiences, and concerns which all humans share by virtue of their common participation in "the human situation." It seeks the academic and cultural common ground. Its subject matter is part of what all truly educated people have (and ought to have) in common.

   The PHY-100 course includes practical knowledge and hands-on learning. The “human situation” is dominated by the consumption of energy including that used for transportation, home heating and electricity. Educated peoples should know what there energy is, where it comes from, and what consequences its generation and consumption has on society.
Critical Thinking
6. A general education course teaches principles and methods of analytic, critical, and systematic inquiry and reasoning that students then apply to the solution of problems relevant to the discipline being studied, thereby enhancing students' ability to make informed, discriminating, and responsible judgments on the basis of logical and critical analysis and evaluation of ideas, events, and issues.

The PHY-100 course includes assessments to quantify the strengths and weaknesses and prospective impact of alternative energy technologies, such as wind and solar power and those related to the hydrogen economy. Availability of energy sources nationally and globally is examined. Discussions and labs implemented on the limitations imposed on using various forms of energy by technological and socioeconomic factors.

Intellectual growth
7. A general education course includes instruction that presents forms of expression, fields of knowledge, and methods of inquiry fundamental to intellectual growth and to an understanding of the world and the human condition

The human condition is dominated by the consumption and continued need for sources of energy. The PHY-100 course examines the historical patterns of energy use and the factors that shaped them.

Communication/Literacy
8. A general education course fosters literacy in writing, reading, speaking, and listening.

The PHY-100 course requires written scientific laboratory reports.

The PHY-100 course requires a term paper on the physics of a particular energy source as well as its political, economic, environmental and social consequences.

The PHY-100 course requires several essays requiring critical thinking throughout the semester.

The PHY-100 class requires a minimum of 10 hours of a service learning project of volunteerism in an energy-related environmental educational activity.

The PHY-100 class requires the student to attend a guided tour of an electrical power plant and ask pertinent questions. The student must then make a written and verbally presentation of their findings to their classmates.
Technological Literacy
9. A general education course includes learning of technological capabilities appropriate to the discipline being studied.

The PHY-100 course will require computer use and energy analysis simulation software. Labs require students to make graphical plots of energy data, use energy related instrumentation such as power meters and voltmeters to examine their home energy consumption.

Information Literacy
10. A general education course fosters forms and levels of information literacy appropriate to the discipline being studied, including the skills and research techniques necessary for effective information access, interpretation, analysis, evaluation, and application.

The PHY-100 course requires a term paper on the physics of a particular energy source as well as its political, economic, environmental and social consequences. Students will need to avail themselves of Library energy related literature. Students will need to learn to access data of the United States Energy Information Administration containing the official energy statistics of the United States government.

Values
11. A general education course increases a student's consciousness of the important social and ethical concerns of the day.

The PHY-100 course requires a minimum of 10 hours of a service learning project of volunteerism in an energy-related environmental educational activity.

The PHY-100 course examines the social and ethical tradeoffs between use of energy to raise the standard of living and the impact resulting from use of energy on environmental pollution.

Integration, Synthesis, Application
12. A general education course enhances a student's ability to integrate, synthesize, and apply in various contexts core knowledge and skills learned in their coursework, not only in the single course but within and across other courses and disciplines.

As per the outline of course student objectives and Bergen Core Competencies listed in the course syllabus, the PHY-100 course learning objectives outlined in the syllabus meet the Bergen Community College core competencies of Communication, Quantitative Reasoning, Critical Thinking, Civic Responsibility, Technological and Informational Fluency, Personal Skills, Applied Knowledge, Creativity and Aesthetic Appreciation.
Citizenship

13. A general education course enhances students' abilities to function as responsible citizens.

The PHY-100 course requires a minimum of 10 hours of a service learning project of volunteerism in an energy-related environmental educational activity.

The PHY-100 course requires a Lab where students will conduct a home energy audit and calculate their carbon footprint, among other environmental consequences.

Continuing Learning

14. A general education course takes students beyond the acquisition of course-specific knowledge and beyond the immediate application of learning and provides them with opportunities for analysis, synthesis, and evaluation of learning.

The PHY-100 course provides for frequent quizzes for self-assessment of learning.

The PHY-100 course provides for post lab class discussions so that individual knowledge learned can be shared to affect application of results to their daily lives.

The PHY-100 course term paper provides for analysis and synthesis of course material.

The PHY-100 course requires a minimum of 10 hours of a service learning project of volunteerism in an energy-related environmental educational activity. This allows direct application of course material learned to benefit the outside-the-classroom community.

4. A course proposed for general education certification at Bergen Community College must address, serve, and support the goals and objectives of the college's general education program, as stated below:

GOAL 1: Communication – Students will communicate effectively in both speech and writing.

Objectives
1.1. Students will analyze, comprehend, and evaluate what they read, hear, and see.
1.2. Students will state and evaluate the views and findings of others.
1.3. Students will write and speak clearly and effectively in standard American English.
1.4. Students will logically and persuasively state and support in speech and in writing their points of view or findings.
1.5. Students will evaluate, revise, and edit their communications.

The PHY-100 course requires experimentation and written scientific laboratory reports.

The PHY-100 course requires a term paper on the physics of a particular energy source as well as its political, economic, environmental and social consequences.
The PHY-100 course requires several essays requiring critical thinking throughout the semester. One includes a quantitative analysis of the effect of specific major political and social events on the time history of oil prices. Another essay includes a quantitative analysis of the overall efficiency of fuel cells and whether or not it is sound competent policy for the government to provide incentives for their adoption by the public for transportation.

The PHY-100 course requires a minimum of 10 hours of a service learning project of volunteerism in an energy-related environmental educational activity. This allows direct application of course material learned to benefit the outside-the-classroom community as well as effective communication with the outside community.

The PHY-100 course addresses all objectives via the course term paper, lab reports, lab result class discussions, community service learning project.

GOAL 2: Critical Thinking, Problem Solving, and Information Processing – Students will use critical thinking and problem solving skills in analyzing information gathered through various media and from a variety of sources.

Objectives
2.1. Students will identify a problem and analyze it in terms of its significant parts and in terms of the information needed to solve it
2.2. Students will select and use appropriate sources of information in a variety of formats.
2.3. Students will evaluate information on the basis of its origin, viewpoint, relevance, accuracy, and completeness.
2.4. Students will recognize weaknesses in arguments such as the use of false or disputable premises, suppression of contrary evidence, faulty reasoning, and emotional loading.
2.5. Students will formulate and evaluate possible solutions to problems, and they will defend the solutions they choose to implement.
2.6. Students will use computers and other electronic tools to access, analyze, and present information.

The PHY-100 course requires experimentation and written scientific laboratory reports. Such experimentation requires the use of computers, software and scientific instrumentation.

The PHY-100 course requires a term paper on the physics of a particular energy source as well as its political, economic, environmental and social consequences. Students will need to avail themselves of Library energy related literature. Students will need to learn to access data of the United States Energy Information Administration containing the official energy statistics of the United States government.

The PHY-100 course requires several essays requiring critical thinking throughout the semester. One includes a quantitative analysis of the effect of specific major political and social events on the time history of oil prices. Another essay includes a quantitative analysis of the overall efficiency of fuel cells and whether or not it is sound competent policy for the government to provide incentives for their adoption by the public for transportation.
**GOAL 3: Ethical Perspective** – Students will recognize, analyze, and assess ethical issues and situations.

Objectives

3.1. Students will identify the ethical implications of an issue or a situation.
3.2. Students will analyze and evaluate the strengths and weaknesses of differing perspectives on an ethical issue or situation.
3.3. Students will take a position on an ethical issue or situation and defend it with logical arguments.

Throughout the course, in readings and in assignments, the link between energy and politics, economics, history, society, and the environment is emphasized.

The PHY-100 course requires a minimum of 10 hours of a service learning project of volunteerism in an energy-related environmental educational activity.

The PHY-100 course examines the social and ethical tradeoffs between use of energy to raise the standard of living and the impact resulting from use of energy on environmental pollution.

**GOAL 4: Quantitative Skills** – Students will apply appropriate mathematical and statistical concepts and operations to interpret data and to solve problems. [Mathematics; Natural Sciences; Social Sciences]

Objectives

4.1 Students will translate quantifiable problems into mathematical terms and solve these problems using mathematical or statistical operations.
4.2 Students will construct graphs and charts, interpret them, and draw appropriate conclusions.

The PHY-100 course requires experimentation and written scientific laboratory reports. Such labs are mathematical in nature, involving graphing of data and data analysis.

The PHY-100 course requires several essays requiring mathematical operations occur throughout the semester. One includes a quantitative analysis of the effect of specific major political and social events on the time history of oil prices. Students will need to analyze data of the United States Energy Information Administration containing the official energy statistics of the United States government.

Another essay includes a quantitative analysis of the overall efficiency of fuel cells and whether or not it is sound competent policy for the government to provide incentives for their adoption by the public for transportation.
**GOAL 5: Science and Technology** – Students will develop an understanding of the nature of science and will be able to distinguish science from other fields of study. Students will apply the scientific method of inquiry to draw conclusions based on verifiable evidence; use scientific theories and knowledge to understand the natural world; and explain the impact of scientific theories, discoveries, and technological changes on society. [Natural Sciences; Social Sciences; Philosophy; History]

**Objectives**

5.1 Students will define science and describe its limitations.
5.2 Using the scientific method and standard laboratory procedures, students will analyze a problem and draw conclusions from data.
5.3 Students will distinguish between scientific theory and scientific discovery and between science and its technological application, and will explain the impact of science and technology on society.

The PHY-100 course requires experimentation and written scientific laboratory reports.

Assignments of the PHY-100 course require students to demonstrate the relationships between energy and society

**GOAL 8: Historical Perspective** – Students will analyze historical events and movements in western and/or non-western societies and assess their subsequent significance. [History; other Humanities disciplines; Social Sciences; Mathematics? Natural Sciences?]

**Objectives**

8.1 Students will state the causes of a major historical event and analyze the impact of that event on a nation or civilization.
8.2 Students will discuss a major idea, movement, invention, or discovery and explain how it affected the world or American society.
8.3 Students will show how various interpretations of historical events are influenced by their time, class, culture, and perspective.

The PHY-100 course requires the history of each energy source and its impact on society to be explored.

The PHY-100 course discusses the science, history, politics, and economics of energy. Energy use is ubiquitous among all cultures. This course examines energy use from antiquity to present, including energy use among Western and non-Western cultures.

One essay assignment includes a quantitative analysis of the effect of specific major political and social events on the time history of oil prices.
5. **A course proposed for general education certification at Bergen Community College must address one or more of the BCC Core Competencies**

The attached syllabus outlines how the PHY-100 course student learning objectives addresses the BCC Core Competencies. It is reproduced here:

<table>
<thead>
<tr>
<th>Competency</th>
<th>Student Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>5, 14, 16, 22</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>4, 5, 7, 17, 21</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>1, 2, 5, 6, 7, 8, 11, 16, 19</td>
</tr>
<tr>
<td>Civic Responsibility</td>
<td>12, 22, 23</td>
</tr>
<tr>
<td>Technological and Informational Fluency</td>
<td>6, 19</td>
</tr>
<tr>
<td>Personal Skills</td>
<td>9, 14, 16</td>
</tr>
<tr>
<td>Interpersonal Skills</td>
<td>23</td>
</tr>
<tr>
<td>Applied Knowledge</td>
<td>3, 9, 13, 14, 17</td>
</tr>
<tr>
<td>Creativity and Aesthetic Appreciation</td>
<td>15, 18, 23</td>
</tr>
</tbody>
</table>

6. **There is a strong presumption that a course proposed for general education certification at Bergen Community College will be transferable – as a general education course – to a significant number of the four-year colleges/universities to which most BCC transfer-students currently transfer.**

The text book used in PHY-100 is the text used in an energy course at Ramapo College.

Transferability to the top transfer target institutions will be sought immediately with the backing of General Education status from Bergen.

The granting of General Education status by Bergen will set a precedent in helping to establish Energy related Physics courses as General Education at the State level.

Also, as per NJ law, a General Education course taken at Bergen by a student obtaining a degree at Bergen is transferable.

In view of the above, it is asked that the Committee consider apply the following of its policy:

“The Committee is free to consider the certification of a course that fails to meet the aforesaid transferability criteria in the event that, on the basis of clear and convincing evidence and cogent argument, the Committee finds that the course is worthy of such consideration regardless of its low "transfer value." However, the Committee shall exercise this freedom prudently and shall not overturn lightly the strong presumption stated above.”
Semester and year:  
Course Name: **PHY 100**  
Meeting Times and Locations:  
Instructor:  
Office Location:  
Phone:  
Departmental secretary:  
Office Hours:  
Email Address:  

**Course description:** This course provides an overview of the nature of energy, its uses, and its effect on the individual, society and the environment. The course will explore the use of energy in contemporary society and the development of renewable energy technologies. Emphasis is placed on conservation, energy efficiency, renewable energy sources and technologies that can be utilized to create a sustainable energy society. The laboratory part of the course will involve service learning projects.

**Credits/Hours:** 4 credits {3 hr. lecture (3cr.) & 3 hr. lab (1 cr.)}.

**Prerequisites and Co-requisites:** MAT - 011

**General Education Course:** We intend to apply for Gen Ed status

**STUDENT LEARNING OBJECTIVES & ASSESSMENT MEASURES:** This course will provide an overview of the physical principles behind energy and its effect on our environment. The course also examines conservation, energy efficiency and renewable energy sources such as: solar, wind, geothermal and nuclear with a focus on how these technologies can be utilized to create a sustainable society. As a result of meeting the requirements of this course, students will be able to:

1. Describe the nature of energy, its uses, and its effect on both the individual and society.
2. Discuss the historical patterns of energy use and the factors that shaped them.
3. Define the law of conservation of energy and be able to apply the fundamental laws of physics governing conversion of energy from one form to another.
4. Describe and quantify the different forms of energy.
5. Evaluate availability of energy sources nationally and globally.
6. Describe the roles and limitations of technologies currently used to sustain the three sectors of a modern economy (transportation, industrial and residential/commercial) and be able to quantify related performance parameters).
7. Assess and be able to quantify the environmental consequences (*pollution* and *climate change*) of today’s energy technologies.
(8) Assess the strengths and weaknesses and prospective impact of alternative energy technologies, such as wind and solar power and those related to a hydrogen economy.

(9) Discuss the important influence of the following non-technical issues on the nations and the world’s energy future:
   (a) Geopolitics   (b) economics   (c) public policy;

(10) Discuss the linkages between ethics and energy utilization.

(11) Evaluate availability of energy sources nationally and globally.

(12) Identify environmental consequences of using various energy sources and understand technologies for addressing these environmental problems.

(13) Assess the negative aspects of reliance on fossil fuels.

(14) Apply analytical methods from a variety of scholarly disciplines to understand factors that will impact selection of energy technologies and policy instruments.

(15) Examine characteristics of energy demand across space and time.

(16) Analyze, critique, and apply policy instruments to either decrease or increase the use of various energy sources.

(17) Analyze empirical data to understand energy choices made by national, state, and local policy makers.

(18) Examine why at times and locations, different patterns of energy extraction, consumption, and conservation were used.

(19) Discuss the limitations imposed on using various forms of energy by technological and socioeconomic factors.

(20) Describe how energy conversion methods are used to change energy from one form to another for appropriate use.

(21) Compare the tradeoffs between use of energy to raise the standard of living and the impact resulting from use of energy on environmental pollution.

(22) Use various sources of knowledge to write logical and coherent papers on important aspects of energy and environment.

(23) Examine how public policy can direct citizen’s efforts in wiser use of energy resources, energy conservation, and prevention of pollution to the environment.

Assessment will be based appropriate examinations, quiz questions, homework questions, homework questions from textbook and instructor’s problem sheets, explanation of the results of laboratory experiments, service learning projects that make direct contributions to creating a more sustainable environment at BCC and/or in the surrounding community.

Course content:

**Lecture topics:**

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Energy</td>
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<td>2</td>
<td>Energy Mechanic</td>
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<tr>
<td>3</td>
<td>Conservation of Energy; Heat and Work</td>
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<tr>
<td>4</td>
<td>Home Energy Conservation and Heat Transfer</td>
</tr>
<tr>
<td>5</td>
<td>Solar Energy: Characteristics and Heating</td>
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<tr>
<td>6</td>
<td>Energy from Fossil Fuels</td>
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<tr>
<td>7</td>
<td>Air Pollution and Energy Use</td>
</tr>
<tr>
<td>8</td>
<td>Global warming, Ozone depletion and Waste Heat</td>
</tr>
<tr>
<td>9</td>
<td>Electricity, Circuits</td>
</tr>
<tr>
<td>10</td>
<td>Electric generation and Transmission</td>
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<tr>
<td>11</td>
<td>Electricity from Solar, Wind and Hydropower</td>
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<tr>
<td>12</td>
<td>Nuclear Power: Effects and Use of Radiation</td>
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<tr>
<td>13</td>
<td>Biomass from Plants to Garbage</td>
</tr>
<tr>
<td>14</td>
<td>Geothermal Energy</td>
</tr>
<tr>
<td>15</td>
<td>A National and Personal Commitment</td>
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</tbody>
</table>

**Laboratory Activities:**

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check in, Safety, Measurement</td>
</tr>
<tr>
<td>2</td>
<td>Mechanical Energy</td>
</tr>
<tr>
<td>3</td>
<td>Conservation of Energy</td>
</tr>
<tr>
<td>4</td>
<td>Heat and Work</td>
</tr>
<tr>
<td>5</td>
<td>Energy from Fossil Fuels</td>
</tr>
<tr>
<td>6</td>
<td>Passive Solar Energy</td>
</tr>
<tr>
<td>7</td>
<td>Electricity, Circuits</td>
</tr>
<tr>
<td>8</td>
<td>Active Solar Energy (Photovoltaic systems)</td>
</tr>
<tr>
<td>9</td>
<td>Electromechanical devices (motors and generators)</td>
</tr>
<tr>
<td>10</td>
<td>Wind Power</td>
</tr>
<tr>
<td>11</td>
<td>Air Pollution and Global Warming</td>
</tr>
<tr>
<td>12</td>
<td>Recycling and Composting</td>
</tr>
<tr>
<td>13</td>
<td>Geothermal (heat pumps)</td>
</tr>
<tr>
<td>14</td>
<td>Biomass (ethanol from corn)</td>
</tr>
<tr>
<td>15</td>
<td>Check out, Laboratory Final</td>
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</tbody>
</table>

**Term/Case Study Paper:**
- An article written on a subject related to Energy and Society, as well as to material presented as part of the case studies;
• This paper must be original and submitted by the assigned deadline. It should be a typewritten paper of 8 to 10 pages with a font size of 12 and double line spacing.

**Supplementary readings/materials:**


**Other requirements:**

A scientific calculator is required. Cell phones cannot be used for calculations. Safety glasses or goggles must be purchased by the student.

**General grading policy:**

**Grading scheme:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90% - 100%</td>
</tr>
<tr>
<td>B+</td>
<td>87% - 89.9%</td>
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<tr>
<td>B</td>
<td>80% - 86.9%</td>
</tr>
<tr>
<td>C+</td>
<td>77% - 79.9%</td>
</tr>
<tr>
<td>C</td>
<td>70% - 76.9%</td>
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<tr>
<td>D</td>
<td>65% - 69.9%</td>
</tr>
<tr>
<td>F</td>
<td>0% - 64.9%</td>
</tr>
</tbody>
</table>

**Instructor’s grading policy:**

This will be provided separately by the individual instructor.

**Attendance/lateness policy:**

All students are expected to attend punctually every scheduled meeting of each course in which they are registered. If a student is absent, s/he is responsible for learning the material covered, including homework assignments and any handouts. Small study groups to review lecture and homework material are usually found to be helpful. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.

**Other services:**

**Electronic Devices:** The use of portable electronic devices such as pagers and cell phones is not permitted while class is in session. Please silence these devices before entering class.
**Student and Faculty support services:**
1. Students experiencing difficulty with the arithmetic or problem solving aspects of this Course should acquaint themselves with the services of the Tutoring Center and Smarthinking.
2. The BCC Library provides extensive support services for student research.
3. Faculty office hours may be a productive vehicle for assistance in understanding the course material.
4. A wide variety of services are available to students with documented disabilities through the Office of Specialized Services (OSS). It is highly recommended that students with documented disabilities contact OSS (Room S-131; 201-612-5270) during the college application process.

**Faculty absence procedure:**
A daily listing of cancelled classes will appear in a glass case near the main corridor on the first floor. Another such listing will appear in a glass case in East Hall. Students can consult these cases before going to class. If students find a class cancelled which has not been listed, they should report this to the Divisional Dean’s Office, S-338, or the Evening Office L113.

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**Bergen Community College**  
**Core Competencies**  
**PHY 100**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Student Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Communication</td>
<td>5, 14, 16, 22</td>
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<tr>
<td>2. Quantitative Reasoning</td>
<td>4, 5, 7, 17, 21</td>
</tr>
<tr>
<td>3. Critical Thinking</td>
<td>1, 2, 5, 6, 7, 8, 11, 16, 19</td>
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<td>4. Civic Responsibility</td>
<td>12, 22, 23</td>
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<tr>
<td>5. Technological and Information Fluency</td>
<td>6, 19</td>
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<tr>
<td>6. Personal Skills</td>
<td>9, 14, 16</td>
</tr>
<tr>
<td>7. Interpersonal Skills</td>
<td>23</td>
</tr>
</tbody>
</table>
All BCC students enrolled in credit courses are entitled to a WebAdvisor account. With WebAdvisor, you may register online, check your schedule, room assignments, GPA, and find out what courses you need to take. To find out more about WebAdvisor or to sign up online, visit <http://go.bergen.edu>! While there, please make sure you give us your preferred email address. You'll find directions how to do this at <http://go.bergen.edu/email>.