LEHMAN COLLEGE
OF THE
CITY UNIVERSITY OF NEW YORK
DEPARTMENT OF PHYSICS AND ASTRONOMY
CURRICULUM CHANGE

1. **Type of change:** New course

2. **Course Description:** AST 101: Introduction to Astronomy. 3 hours, 3 credits. Basic exploration of our universe and the laws that govern it. History and origins of the universe, life-cycles of stars and galaxies, properties of the sun and planets, the motion of the earth and its effect on seasons and astronomical observation.

3. **Rationale:** Consistent with changes in curricular structures and in the pedagogy of scientific learning, we would like to propose this new introduction to the study of the universe and our place within it. Offering an accessible, appealing, and rigorous survey of astronomy is an ideal way of introducing students to such basic scientific concepts as motion, gravity, and light, developing in them an empirically-based quantitative understanding of scientific concepts, and encouraging them to use their acquired expertise to explain the behavior of the universe around them.

4. **Learning Objectives:**
   - Demonstrate an understanding of the various scales of space, time, and energy that define our universe.
   - State basic concepts and properties of motion, light, and gravity, and explain how these concepts account for the behavior of the universe on astronomical scales.
   - Describe the motion of the earth and how it affects climate, seasons, and our view of the sky.
   - Explain the properties and life-cycle of stars.
   - Report accurately on the structure, formation, and evolution of galaxies.
   - Explain the Big Bang theory as well as the structure and evolution of the universe.
   - Demonstrate proficiency in the use of observational tools of astronomy, in particular telescopes and spectrographs.
   - Demonstrate familiarity with the systems of measurement and use of quantitative evidence that have led to our present understanding of astronomical phenomena.

5. **Date of Physics and Astronomy Departmental Approval:** September 5, 2012
LEHMAN COLLEGE
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DEPARTMENT OF PHYSICS AND ASTRONOMY

CURRICULUM CHANGE

1. **Type of change**: New Course

2. **Course Description**: PHY 131: Conceptual Physics. 3 hours (2 lecture, 1 lab), 3 credits. Basic concepts and methods of physics. The nature of physical laws and the methods by which these laws are developed and tested. Topics include motion and energy; heat, light, and sound; the structure of matter; gravity, electricity, and magnetism.

3. **Rationale**: Consistent with changes in curricular structures and in the pedagogy of scientific learning, we would like to propose this new introduction to the study of the physical sciences. Offering an accessible, appealing, and rigorous survey of the concepts underlying our apprehension of the physical universe—via lectures, demonstrations, and laboratory experiments—is an ideal way of empowering students to understand the nature of physical law, develop scientific theories, and use empirical tools to conduct scientific investigations.

4. **Learning Objectives**:
   - Identify and state the basic concepts underlying our understanding of the physical world.
   - Use basic scientific concepts to solve simple problems in such areas as mechanics, optics, electricity, and gravitation.
   - Carry out laboratory investigations using appropriate empirical and quantitative tools.
   - Prepare well-written laboratory reports that accurately detail lab findings.
   - Demonstrate an understanding of the nature of scientific laws and the methods by which these laws are developed and tested.

5. **Date of Physics and Astronomy Departmental Approval**: September 5, 2012
LEHMAN COLLEGE
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DEPARTMENT OF PHYSICS AND ASTRONOMY

CURRICULUM CHANGE

1. **Type of change:** New Course

2. **Course Description:** PHY 141: Sound, Speech, and Music. 3 hours (2 lecture, 1 lab), 3 credits. Introduction to the physics of sound and the principles underlying speech, hearing, and music. Sound waves and their properties. The production, propagation, and perception of sound. Acoustics. The recording and reproduction of sound. Note: Appropriate for students interested in Speech-Language-Hearing Sciences and in Music.

3. **Rationale:** Consistent with changes in curricular structures and in the pedagogy of scientific learning, we would like to propose this new introduction to the scientific study of sound, speech, and music. Offering an accessible, appealing, and rigorous survey of the concepts underlying our apprehension of sound—via lectures, demonstrations, and laboratory experiments—is an ideal way of empowering students to understand both the physical properties of sound and the role these properties play in our capacity to understand speech and hear music. The survey also encourages students to discern how scientific theories develop over time, and to gain hands-on experience using empirical tools to conduct scientific investigations.

4. **Learning Objectives:**
   - Demonstrate an understanding of the physical properties of sound and the role these properties play in speech, hearing, and music.
   - State and use appropriate concepts to solve quantitative problems involving sound production, propagation, and perception.
   - Carry out laboratory experiments to test and verify the properties and nature of sound, and prepare well-written laboratory reports describing their findings.
   - Demonstrate an understanding of the nature of scientific laws, in particular with regards to sound, and the methods by which these laws are developed and tested.

5. **Date of Physics and Astronomy Departmental Approval:** September 5, 2012
1. **Type of change:** New Course

2. **Course Description:** PHY 151: Energy and the Environment. 3 hours (2 lecture, 1 lab), 3 credits. Energy as a physical concept: various forms of energy, conservation of energy, heat and thermodynamics, energy from fossil fuels, electrical energy and its generation, solar energy, nuclear energy. The environmental effects of the generation of energy: air pollution, global warming, nuclear radiation in the environment.

3. **Rationale:** Consistent with changes in curricular structures and in the pedagogy of scientific learning, we would like to propose this new introduction to the study of energy and the environment. Offering an accessible, appealing, and rigorous survey of energy as a scientific concept—via lectures, demonstrations, and laboratory experiments—is an ideal way of empowering students to explore the various methods that have been used to control energy and to demonstrate the impact of energy on daily life. Because the concept of energy is central to environmental sciences—modern society is based on its ability to transform one form of energy into another and its ability to deal with the environmental consequences of these transformations—this course will be required for the new degree program leading to a B.S. in Environmental Science.

4. **Learning Objectives:**
   - Explain how energy is an abstract general concept useful across all the sciences.
   - Report on the physical laws relevant to energy production, transformation, and use.
   - Demonstrate familiarity with the geo-political patterns of energy use and of the available resources for energy production.
   - Identify basic physical principles—the law of conservation of energy, the concepts of heat and work, and the first and second laws of thermodynamics—and apply them to the analysis of quantitative physical problems.
   - Discuss the concept of entropy, the constraints it imposes on energy production, and its consequences.
   - Report on the science behind various forms of energy production, including fossil fuels, hydro, solar, wind, and nuclear resources.
   - Trace the environmental impacts of the various forms of energy production, including air pollution, global warming, and nuclear radiation.
   - Evaluate the prospects of future energy alternatives, such as thermonuclear fusion, biomass and garbage, and geothermal sources.

5. **Date of Physics and Astronomy Departmental Approval:** September 5, 2012