COMMON COURSE OUTLINE: Course discipline/number/title: SCIE 1200: Integrated Earth Science and Physics

A. CATALOG DESCRIPTION
1. Credits: 3
2. Hours/Week: 2 hours lecture, 2 hours lab
3. Prerequisites (Course discipline/number): 12th grade reading and writing skills
4. Co-requisites (Course discipline/number): None
5. MnTC Goals (if any): Goal 2/Critical Thinking and Goal 3/Natural Sciences

This one semester course is designed to introduce students to key concepts in earth science and physics using an integrated approach. The course covers basic terminology while emphasizing the connection between earth science and physics in major content areas which include: earth and space, motion and force, energy, waves, meteorology and climate, earth materials, surface environments, electricity, and sources and production of energy.

B. DATE LAST REVISED (Month, year): January, 2011

C. OUTLINE OF MAJOR CONTENT AREAS:
1. Introduction to Science
   a) Nature of Science
   b) Historical Perspective
      i. Key Theories in Earth and Space Science
         a) Geocentric (2b)
         b) Plate Tectonics (8a)
         c) Controls on Climate (6e)
      ii. Key theories in Physics
   c) Scientific Method and Evolution of Scientific Theories
2. Earth and Space
   a) Formation of Universe and Stars
   b) Solar System
      i. Planetary formation
      ii. Planetary Evolution
      iii. Earth Grid
3. Motion
   a) Quantifying Motion
      i. Position
      ii. Velocity
      iii. Acceleration
   b) Forces and Motion
      i. Newton’s Three Laws
      ii. forces and Circular Motion
      iii. Gravitation
      iv. Orbital Motions- Kepler’s Laws
      v. Lunar Phases/Eclipses
4. Energy
   a) Forms of Energy
      i. Work
      ii. Kinetic and Potential Energy
      iii. Nuclear Energy
   b) Conservation of Energy
5. Waves
   a) Properties of waves
      i. Wavelength
      ii. Frequency
   b) Electromagnetic waves and the spectrum
C. OUTLINE OF MAJOR CONTENT AREAS: Continued . . .

6. Meteorology and Climate
   a) Earth-Sun Relations (Seasons)
   b) Heating of the Atmosphere
   c) Water and the Atmosphere
   d) Controls on Weather
      i. High/Low Pressure
      ii. Fronts
      iii. Prediction
      iv. Severe Weather
      v. Hurricanes/Tornadoes
   e) Controls on Climate
      i. Earth/Sun Relations
      ii. Greenhouse Gases
      iii. Volcanoes
      iv. Ocean Circulation
      v. Anthropogenic

7. Earth Materials
   a) Minerals
      i. Economic Uses of Minerals
      ii. Environmental Consequences of Mineral Extraction
   b) Rocks
      i. Classification
      ii. Igneous
      iii. Sedimentary
      iv. Metamorphic
      v. Rock Cycle
      vi. Fossils
      vii. Economic Uses of Rocks

8. Earth’s Interior and Surface Processes
   a) Plate Tectonics
      i. Interior Structure
      ii. Earthquakes
      iii. Volcanoes
      iv. mountain Building
   b) Rivers
      i. Controls of Flow
      ii. Geomorphic Consequences
      iii. Flooding/Hazards
   c) Coastlines
      i. Wave/Coastal Interaction
      ii. Geomorphic Consequences
   d) Glaciers
      i. Function
      ii. Geomorphic Consequences
      iii. Ice Age Driving Factors
   e) Earth History

9. Electricity
   a) Electric Charge
   b) Electrical quantities
      i. Voltage
      ii. Current
      iii. Resistance
      iv. Power
   c) Simple Circuits
      i. Series
      ii. Parallel
C. OUTLINE OF MAJOR CONTENT AREAS: Continued...

10. Sources and Production of Energy
   a) Production of Electricity
      i. Electromagnetic Induction
      ii. Generators
   b) Energy Sources
      i. fossil Fuels
      ii. Nuclear
      iii. Geothermal
      iv. Hydropower
      v. Wind
      vi. Solar
      vii. Biomass
   c) Implications for Society

D. LEARNING OUTCOMES (GENERAL): The student will be able to:
   1. Use appropriate terminology to explain fundamental concepts of earth science and physics.
   2. Demonstrate the ability to make connections within and across earth science and physics.
   3. Design and conduct scientific investigations, evaluate results and draw logical conclusions.
   4. Use scientific understandings and abilities when making decisions about personal and societal issues.

E. LEARNING OUTCOMES (MNTC):
   Goal 2/Critical Thinking: The student should be able to:
   1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.
   2. Imagine and seek out a variety of possible goals, assumptions, interpretations, or perspectives which can give alternative meanings or solutions to given situations or problems.
   3. Analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.
   4. Recognize and articulate the value assumptions which underlie and affect decisions, interpretations, analyses, and evaluations made by ourselves and others.

   Goal 3/Natural Sciences: The student should be able to:
   1. Demonstrate understanding of scientific theories.
   2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
   3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.
   4. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

F. METHODS FOR EVALUATION OF STUDENT LEARNING:
   Methods may include any of the following:
   1. Lab reports and/or quizzes
   2. Lecture quizzes
   3. Group work/projects
   4. Presentations
   5. Exams

G. RRTC CORE OUTCOME(S) ADDRESSED:
   ☑ Communication  ☑ Civic Responsibility
   ☑ Critical Thinking  ☑ Personal/Professional Accountability
   ☑ Global Awareness/Diversity  ☑ Aesthetic Response

H. SPECIAL INFORMATION (if any): None