



DEPARTMENT OF SCIENCE  
COURSE INFORMATION SHEET FOR  
**SCI102 – SCIENCE INQUIRY FOR  
EARTH/PHYSICAL**

*All members of the Science Department at Clinton Community College use the respective course templates as a basis for their course syllabi. Faculty may, at their discretion, change the order of the course content or add course content.*

**COURSE NUMBER AND TITLE:** SCI102 – Science Inquiry for Earth/Physical

**COURSE SECTION:** *TBA*

**CONTACT HOURS:** 5      **CREDIT HOURS:** 4

**SEMESTER AND YEAR:** *TBA*

**INSTRUCTOR’S NAME, TELEPHONE NUMBER, EMAIL ADDRESS, OFFICE NUMBER, AND OFFICE HOURS:** *TBA*

**I. COURSE DESCRIPTION:**

This course is an interdisciplinary science course providing an overview of key physical, earth and space, and science and technology concepts as they pertain to the core curriculum for elementary (K-4) education and NYS Mathematics, Science, and Technology Standards. This course is designed to introduce non-science majors and future educators to physical science concepts through methods of inquiry. The laboratory reinforces science content discussed in lecture and students will further develop their understanding of science using the process of inquiry. There are three hours of lecture and one two-hour laboratory per week.

This course meets the SUNY General Education course requirements for natural sciences.

**II. COREQUISITE:** ENG101 – English Composition and MAT100 – Introductory Algebra or their equivalents

**III. COURSE OBJECTIVES, SUNY GENERAL EDUCATION KNOWLEDGE AREA LEARNING OUTCOMES AND ASSESSMENT:**

**COURSE OBJECTIVES:**

As the result of instructional activities, students will be able to:

1. Interpret and analyze scientific information.
2. Develop hypotheses based on the observation of natural phenomena.
3. Explain experimental design based on a testable hypothesis as a result of observation and prediction.

4. Record and organize data resulting from quantitative measurement using tables and graphs.
5. Interpret and analyze data and come to conclusions based on the evidence presented.
6. Describe the laws governing motion of objects and differentiate between types of motion as they apply to everyday experiences.
  - Determine the distance traveled for an object moving with constant velocity and constant acceleration.
  - Determine the time required for an object to free fall a given distance
  - Describe the acceleration due to gravity and its relationship to weight.
  - Describe Newton's Laws and apply them to everyday experiences.
  - Identify what components of the NYS MST Standards relate to dynamics and motion.
7. Analyze an event or system by describing the forms of energy.
  - Describe the nature of work and power
  - Define energy and describe its relation to work
  - Describe the difference between kinetic energy and potential energy
  - State the law of conservation of energy and describe how it applies in everyday situations.
  - Explain the conversion between different forms of energy.
  - Identify what components of the NYS MST Standards relate to energy.
8. Describe the nature and behavior of thermal energy.
  - Distinguish among the three temperature scales (Fahrenheit, Celsius and Kelvin) used to measure temperature.
  - Convert between units of the three temperature scales.
  - Define heat and the units of heat measurement.
  - Define specific heat capacity and apply that definition to simple heat transfer problems
  - Describe and define the three methods by which is transferred.
  - Describe how specific heat capacity and heat transfer influences our environment.
  - Describe the first and second law of Thermodynamics.
  - Identify what components of the NYS MST Standards relate to thermal energy.
9. Describe the nature and behavior of electricity, magnetism, and electromagnetism.
  - Describe the nature and behavior of electrical charges.
  - Distinguish between static electricity and an electric current.
  - Calculate the forces that exist between two electrical charges using Coulomb's law.
  - Compare and contrast an electrical field with a magnetic field.
  - Describe the nature of magnetic fields surrounding electrical currents and how they apply to electromagnets.
  - Describe the characteristics of an electrical circuit.
  - Apply Ohm's law to simple circuits.
  - Define current, voltage and resistance and how they are related in electrical circuits.
  - Describe how electrical impulses are used in the human body to transmit information.
  - Identify what components of the NYS MST Standards relate to electricity, magnetism and electromagnetism.
10. Describe the nature of waves including light, sound and electromagnetic radiation.

- Describe and define wavelength, frequency, velocity and amplitude.
  - State the wave equation and apply it to the solution of problems.
  - Distinguish between transverse waves and longitudinal waves.
  - Describe the importance of electromagnetic radiation to the activities of living organisms.
  - Describe the Doppler Effect.
  - Describe the properties of light including how it propagates, color, intensity, reflection, and refraction.
  - Describe image formation in mirrors and lenses.
  - Distinguish between real and virtual images.
  - Discuss the electromagnetic spectrum and the importance of different types of waves to technological developments.
  - Identify what components of the NYS MST Standards relate to waves, light, sound and the electromagnetic spectrum.
11. Describe the origin of the universe and identify the components of the solar system.
- Discuss the big bang theory of the origin of the universe, and indicate several lines of evidence for this theory.
  - List the planets of the solar system, and distinguish between the terrestrial planets and the Jovian planets.
  - Describe the anatomy of the sun and that the sun is the major source of energy for phenomena on the earth's surface.
  - Describe the formation and early history of Earth.
  - Discuss the internal structure of Earth.
  - Discuss the differences in the atmospheres of the planets and the properties necessary to support life.
  - Distinguish between asteroids and comets, and discuss how they might affect Earth.
  - Describe the differences among meteoroids, meteors, and meteorites.
  - Describe the motions of the Earth and its relationship to the sun.
  - Describe the phases of the Earth's moon.
  - Identify key ideas in the NYS MST Standards that relate to the solar system.
12. Describe the processes of a dynamic Earth that are constantly changing both internally and externally.
- Describe the forces that cause mountains to be built up and worn away.
  - Describe changes in the Earth's surface due to slow processes (erosion and weathering) and rapid processes (landslides, volcanic eruptions, and earthquakes).
  - Describe the layering of solid earth including the lithosphere, convection mantle, and metallic core.
  - Describe the phenomenon of continental drift, and indicate the forces responsible for the movement of tectonic plates.
  - Describe the major geological events, such as earthquakes, volcanic eruptions, and mountain building that result from plate motions.
  - List several lines of evidence for continental drift.
  - Identify three main types of boundaries that separate the Earth's tectonic plates: divergent, convergent and transform.

- Identify the key ideas in the NYS MST Standards relating to the phenomena observed on Earth that involve interactions among components of air, water, and land.
13. Identify the cyclic nature of the Earth materials and how a change in one cycle affects the others.
- List the three major cycles of Earth material.
  - Describe the factors that influence the circulation of the atmosphere.
  - Discuss the differences between weather and climate.
  - List the more common types of storms that move around the planet.
  - Discuss the factors that influence the movement of water from the atmosphere, through the ocean, land masses, and living organisms.
  - Discuss the factors that determine the patterns of ocean currents.
  - Differentiate among igneous, sedimentary, and metamorphic rocks.
  - Discuss the interdependence of the Earth cycles.
  - Identify the key ideas in the NYS MST Standards relating to the phenomena observed on Earth that involve interactions among components of air, water, and land.
14. Identify scientific principle(s) upon which technology is based and identify examples of the interdependence between science, technology, and society.

#### **SUNY GENERAL EDUCATION KNOWLEDGE AREA LEARNING OUTCOMES:**

Students will demonstrate the ability to:

1. understand the methods scientists use to explore natural phenomena, including:
  - observation
  - hypothesis development
  - measurement and data collection
  - experimentation
  - evaluation of evidence
  - employment of mathematical analysis
2. apply scientific data, concepts and models in one of the natural sciences

#### **IV. REQUIRED TEXTBOOK AND MATERIALS:**

##### **REQUIRED TEXTBOOK:**

1. Integrated Science, 3<sup>rd</sup> edition; Tillery. McGraw-Hall.  
ISBN # 0-073-22273-9
2. Lab Manual  
ISBN # 0-390-71564-6

##### **REQUIRED MATERIALS:**

1. A Resource Guide to the NYS Learning Standards and Science Core Curriculum This is an in class resource which can be located at [www.emsc.nysed.gov/ciai/](http://www.emsc.nysed.gov/ciai/)
2. Safety glasses are required for all on-campus sections.

**V. METHODS OF INSTRUCTION/COURSE ORGANIZATION:** *To be determined by the respective instructor.*

**VI. ATTENDANCE PROCEDURE (INCLUDING MAKEUP POLICY):** *To be determined by the respective instructor.*

**VII. BIBLIOGRAPHY OF READINGS (IF APPLICABLE):** *To be determined by the respective instructor.*

**VIII. METHODS OF EVALUATION (INCLUDING THE CALCULATION OF COURSE GRADE):** *To be determined by the respective instructor. The methods of evaluation shall include tests (test types, length and weight of each), papers (weight of each), projects (weight of each), and other forms of evaluation (weight of each).*

**IX. GRADING SCALE:** *To be determined by the respective instructor. The grading scale shall indicate what numerical scores correspond to the following grades: A, A-, B+, B, B-, C+, C, C-, D+, D, and F.*

*Please Include:* If you have, or suspect you may have, any type of disability or learning problem that may require extra assistance or special accommodations, please speak to me privately after class or during my office hours as soon as possible so I can help you obtain any assistance you may need to successfully complete this course. You should also contact Laurie Bethka, Room 420M in the Academic Assistance Center, for further assistance.

**X. GENERAL TOPICS OUTLINE:**

1. The Process of Scientific Inquiry: An Historical Perspective
2. The Nature of Science
3. The Universe: Big Bang Theory
4. The Sun
5. The Planets, formation of Earth, internal structure of Earth
6. Planetary Environments and Uniqueness of Earth
7. Earth seasons, phases of the Moon
8. Planetary Objects: asteroids, comets, meteoroids, meteors, and meteorites
9. Plate Tectonics
10. Cycles of the Earth: Water cycle, atmospheric cycle (weather vs. climate)
11. The Rock Cycle: age of the Earth, igneous, sedimentary, and metamorphic
12. Interdependence of Earth's Cycles
13. Newton's Laws: speed, velocity, acceleration, weight vs. mass
14. Energy- Law of conservation of Energy
15. 1<sup>st</sup> Law Thermodynamics
16. Newton's Laws: speed, velocity, acceleration, weight vs. mass
17. Energy- Law of conservation of Energy
18. 1<sup>st</sup> Law Thermodynamics
19. Energy: work and power
20. Kinetic and Potential Energy
21. Electricity and Magnetism
22. Voltage and batteries, concept of a field
23. Electricity and Magnetism
24. Electric Current, Electric Circuits, Ohm's Law

- 25. Electromagnetism
- 26. Properties and characteristics
- 27. Electromagnetic Radiation/Characteristics of Waves
- 28. Sound and Light

**XI. ACADEMIC INTEGRITY:** Academic honesty is expected of all Clinton Community College students. It is academically dishonest, for example, to misrepresent another person's work as one's own, to take credit for someone else's work or ideas, to accept help on a test, to obtain advanced information on confidential test materials, or to intentionally harm another student's chances for academic success.

**XII. COURSE CONTINUITY PLAN:** In the case that the college officially closes because of an emergency which causes a short term disruption of this course, we will utilize e-mail to continue this course in the short term (1-3 weeks). All students need to utilize their campus e-mail to receive course related information.