

# Native Ways of Knowing

## Secondary Science Teacher Education Program

### Content Courses Sorted by Major

Revised 3-25-2010

## **Biology:**

### **BIOL 150/L and 151/L: General Biology (8)**

These courses are an introductory study of the scientific method, chemical and physical organization of living matter, how living things obtain and use energy, the basic structure and function of cells, heredity, and other basic concepts.

### **BIOL 220/L and 221/L: Anatomy and Physiology (8)**

This is an introductory study of the basic chemistry, cellular biology, integument system, skeletal system, muscular system, and nervous system. The second course continues with a study of the endocrine system, cardiovascular system, digestive and urinary systems, and reproductive system of human beings.

### **BIOL 332/L: Ecology (4)**

This thematic-based linked course develops the fundamental facts, concepts, and theory of ecology. Many topics will incorporate concepts learned in Environmental Chemistry (CHEM 380). Local habitat of the Turtle Mountain Reservation will be considered the basis for laboratory investigations. Traditional ecological knowledge and resource management strategies of northern indigenous people will be studied.

### **BIOL 350/L: Freshwater Biology (4)**

This course is a study of biological, chemical, and physical characteristics of inland waters including origins, interrelationships and the effect of civilization.

### **BIOL 363/L: General Entomology (4)**

This course is an introductory study of the classification, taxonomy, collection methods, behavior, ecology, anatomy, and physiology of insects.

### **BIOL 401: Biodiversity (3)**

This thematic-based linked course provides an in depth exploration in the science of biodiversity. Students will survey all the major taxonomic classes of animals and plants using contemporary and historical analysis. Topics covered include genetics, systematic evolution, speciation and extinction, and conservation biology. The local turtle Mountain region will serve as the living laboratory in this course.

### **BIOL 470: Research Experience (2)**

This course provides teacher candidates the opportunity to carry out research in a laboratory or field setting. Students will collect, analyze, and interpret data that will culminate in a written research report and support documents.

### **MATH 107: Pre-Calculus (4)**

This course addresses equations and inequities; polynomial, rational, exponential, logarithmic and trigonometric functions; inverse trigonometric functions, algebraic and trigonometric methods commonly needed in calculus.

## Chemistry:

### **CHEM 121/L: General Chemistry (4)**

This is a study of matter, measurement, atoms, ions, molecules, reactions, chemical calculations, thermo-chemistry, bonding, molecular geometry, periodicity, and gases.

### **CHEM 122/L: General Chemistry (4)**

This is a study of intermolecular forces, liquids, solids, kinetics, equilibria, acids, bases, solution chemistry, precipitation, thermodynamics, and electrochemistry.

### **CHEM 240: Fundamentals of Organic Chemistry (3)**

*Prerequisite: CHEM 121/L*

Emphasis is on structure and bonding, nomenclature; hydrocarbons, aromatics, stereochemistry, alcohols, phenols, ethers, amines, carbonyls: aldehydes, ketones, carboxylic acids, esters, and amides.

### **CHEM 301: Biochemistry (4)**

This is a study of major classes of biological compounds, synthesis of macromolecules, enzyme kinetics, intermediary metabolism, recombinant DNA technology, and bioenergetics.

### **CHEM 333/L: Forensic Chemistry (4)**

This is a study of analytical chemistry techniques in a modern science laboratory. Principles of quantitative and qualitative chemical analysis as applied to environmental, clinical and forensic science are investigated.

### **CHEM 380: Environmental Chemistry (3)**

This examines the interaction of chemical substances with the environment. Water quality and air quality are of primary interest. Labs investigate the impact of chemical pollutants on the Turtle Mountain Reservation and surrounding community.

### **CHEM 431: Analytical Chemistry (2)**

This course includes chemical equilibrium with its analytical applications, introduction to chromatography, and potentiometry.

### **MATH 165: Calculus (4)**

This incorporates the study of the limits, continuity, differentiation, indefinite integrals, definite integrals application of derivative, logarithmic and exponential functions, and numerical integration.

## Earth Science:

### **Astronomy 110/L: Principles of Astronomy (4)**

This course addresses the Earth as a planet within the solar system, including stars, galaxies, and the universe. Star maps and telescopes are used for scheduled night labs.

### **ASTR 150: Intro to Meteorology and Climatology (3)**

This course addresses basic meteorology climatology concepts and their application; includes energy balance, greenhouse effect, temperature, pressure systems, lows, highs, fronts, winds, clouds, storms, humidity, precipitation and measurements.

**GEOL 101/L: Environmental Geology (4)**

This course gives an historical overview of the Earth before inhabitation human beings and the study of human interactions with the Earth. It includes major environmental problems facing mankind today (ex. Water resources, energy, mineral resources & hazards), GIS and GPS instruction.

**GEOL 105/L: Physical Geology (4)**

This course studies the Earth as a physical body, its structure, composition, and geologic processes acting upon and within the Earth.

**GEOL 320: Oceanography (3)**

The nature, origin, and evolution of ocean basins and sea water are emphasized and sea water, chemistry, movement, and ability to support life are also addressed.

**GEOL 450: Sedimentology/Stratigraphy with Field Methods (4)**

Interpretation of geology in the field; preparation of base maps and plotting geological data. Lecture and one week field experience.

**Physics:**

**MATH 165: Calculus (4)**

This addresses limits, continuity, differentiation, indefinite integrals, definite integrals, application of derivative, logarithmic and exponential functions, and numerical integration.

**PHYS 211/L and 212/L: College Physics I & II (8)**

This covers basic principles of bodies in motion. In the second semester, students study the laws of electricity, magnetism, and optics.

**PHYS 275: Planetarium Science (2)**

This course incorporates the study of the operation and maintenance of a planetarium model and the demonstration of astronomical principles. Students are expected to be participants in community initiatives that focus on elementary and secondary science education.

**PHYS 310: Philosophical Issues in Physics (2)**

This course examines the historical, ethical, and modern constructs of physics. Topics include biographical study of seminal physicists, nuclear holocaust, and implications for the future of planet Earth, and themes of physics that lead to the fundamental observations of symmetry in nature, cosmology, and astrophysics.

**PHYS 320: Physical Science for Teachers (4)**

This course is designed for students who are in the teacher education program, but is not exclusive to those students. Physical science for Teachers is a college level physical science course that combines lecture and laboratory work in a way that focuses on teaching methodology that most effectively engages students in the realm of science from the context and perspective of the rural Native student.

**PHYS 321/L: Optics (3)**

This incorporates physical optics, including interference, diffraction, and the electromagnetic properties of light.

**PHYS 405/L: Advanced Physical Science by Inquiry (4)**

***Lecture 2 hrs & Lab 4 hours. Prerequisite: Permission of instructor***

This course is designed to expose future secondary teachers to inquiry methods in physical science and to teach them alternate reasoning methods that can be used at a variety of instructional levels.

**PHYS 412/L: Astronomical Instruments and Observing (3)**

This course addresses astronomical instruments; telescopes, cameras, CCD, photometry, spectroscopy and students demonstrate how to use the various instruments to study and observe star systems and celestial objects.