

## SCIENCE REQUIREMENT

The central concern of Science Distributed Disciplinary Foundation courses at WCU is to expose students to the world-views and toolset of traditional science disciplines. This includes teaching students to observe and to gather and analyze quantitative data, to gain experience with graphical or tabular presentations of quantitative information, and to use quantitative methods to support or refute a hypothesis, as they examine the natural or physical world. Science Distributed Disciplinary Foundations courses emphasize the cognitive skills of critical thought, creativity, analysis, and synthesis that are central to a foundation in general education, and have content directed largely toward the experimental study of the natural or physical world using the commonly accepted methods of science.

Students must earn 6-8 credits of Science Distributed Disciplinary Foundations coursework. Students must select courses from two different disciplines. Students must select courses outside of the student's major.

This requirement can be fulfilled via transfer credits.

### BIO

#### **BIO 100. Basic Biological Science. 3 Credits.**

Basic principles of biology. Cell theory, metabolism, genetics, development, diversity of life forms, and ecology. Not open to biology majors.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall, Spring & Summer.

#### **BIO 110. General Biology I. 4 Credits.**

The concepts general to all living organisms such as cell structure and function, genetics, evolution, and ecology. This course is designed for majors in biology and related scientific areas.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall, Spring & Summer.

### CHE

#### **CHE 100. Concepts of Chemistry. 3 Credits.**

A broad survey course with a laboratory experience that seeks to develop an understanding of the field of chemistry through inquiry. Basic competence in scientific methods and procedures will be obtained by observing chemical reactions and studying the chemical and physical properties of a variety of compounds.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall.

#### **CHE 103. General Chemistry I. 3 Credits.**

Basic laws and theories of chemistry, including atomic structure, chemical bonding, oxidation-reduction, solutions, and ionic equilibria. Correlations of chemical principles and their application to modern descriptive chemistry. CHE 103 must precede CHE 104.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall, Spring & Summer.

#### **CHE 107. General Chemistry for Allied Health Sciences. 4 Credits.**

A one-semester treatment of the fundamentals of chemistry, including atomic structure and bonding, types of reactions, kinetics, equilibrium, and thermodynamics. May not be taken as a chemistry major elective. CRL 107 may be taken concurrently or after CHE 107.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall, Spring, Summer, Winter.

#### **CHE 160. The Chemistry of Beer. 3 Credits.**

An introduction to the chemistry of beer, including its properties, ingredients, production, and origins. The chemistry and biochemistry of alcohol will also be covered.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Spring.

### CSC

#### **CSC 110. Fundamentals in Computer Science. 3 Credits.**

Introduction to the fundamentals of computer science. Topics include surveys of the following sub-areas of computer science: artificial intelligence, hardware/operating systems, programming languages/software, ethics/social issues, history, electronic communications, problem solving, and programming. The course includes laboratory projects (writing computer programs).

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall, Spring & Summer.

#### **CSC 112. Programming & Data Science. 3 Credits.**

Introduction to the fundamentals of business computing. Topics include surveys of the following sub-areas of computer science: hardware/operating systems, programming languages/software, ethics/social issues, problem solving, and advanced MS Excel and Scratch programming for business use. The course includes laboratory projects in MS Excel and Scratch.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall, Spring & Summer.

#### **CSC 115. Introduction to Computer Programming. 3 Credits.**

The art and science of computing are introduced using an object-oriented programming language, such as Python. Topics include looping, branching, arrays, and program development.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

#### **CSC 116. Computational Thinking for Problem Solving. 3 Credits.**

This course provides an introduction to problem solving and programming using Python. Computational thinking is an approach to solve problems using concepts and ideas from computer science and express solutions in a way that can be run on a computer. Topics covered in this course include (1) four pillars of computational thinking, namely decomposition, pattern recognition, data representation and abstraction, algorithms; (2) fundamental operations of a modern computer; (3) basic algorithms in computer science; and (4) programming using Python.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

#### **CSC 141. Computer Science I. 3 Credits.**

An introduction to programming using Python. Topics covered include basic program design; program flow including decisions, functions, and loops; command line and file input/output; variables and types; and string and sequence processing.

Gen Ed Attribute: Science Distributive Requirement.

Distance education offering may be available.

Typically offered in Fall, Spring, Summer, Winter.

### ESS

#### **ESS 101. Introduction to Geology. 3 Credits.**

The earth's composition and history; the processes that occur on and within the earth.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall, Spring & Summer.

#### **ESS 111. Other Worlds, Other Stars. 3 Credits.**

An introductory course in astronomy. Topics will focus on the observable changes in the night sky, the properties of light, the laws of motion, the formation and composition of the solar system, extra solar planets, the properties of stars, stellar evolution and stellar death.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

#### **ESS 112. Galaxies and Cosmology. 3 Credits.**

An introductory general education course in astronomy. Topics will focus on the properties of light and matter, the evolution of stars and galaxies, and the expansion, structure, history and fate of the universe. Three hours of lecture.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

**ESS 127. Movies, Media, and Entertainment from an Earth and Space Science Perspective. 3 Credits.**

An exploration of movies, media, and other mass communication media from an earth and space science perspective. Films, digital media (including trending videos or articles in social media news feeds), traditional news media, and other mass communication entertainment media will be viewed and analyzed to identify earth and space science topics and to correct these inaccuracies.

Gen Ed Attribute: Science Distributive Requirement.

Distance education offering may be available.

Typically offered in Fall & Spring.

**ESS 128. The Science of Natural Disasters. 3 Credits.**

This course explores the science of natural disasters such as volcanoes, earthquakes, tsunamis, hurricanes, tornadoes, climate change, and asteroid impacts. Students will learn to apply the tools of science to understand the processes behind natural hazards, quantify and communicate risk, and develop mitigation strategies to protect societies and the environment.

Gen Ed Attribute: Science Distributive Requirement.

Distance education offering may be available.

Typically offered in Fall, Spring & Summer.

**ESS 130. Our Ocean. 3 Credits.**

This course examines the physical and biological processes in our ocean. The course begins with an overview of earth and ocean, and the history of earth. It will cover four areas of oceanographic research area: physical, chemical, biological, and geological oceanography.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

**ESS 170. Introduction to Our Atmosphere. 3 Credits.**

Why is the sky blue? What will the weather be tomorrow? What makes tornadoes? How did the ozone hole develop? What is the greenhouse effect? This class will use these questions and others to investigate the basic physical processes that determine the weather and climate on earth. A student who has successfully completed ESS 370 may not subsequently receive credit for ESS 170.

Gen Ed Attribute: Science Distributive Requirement.

Distance education offering may be available.

Typically offered in Fall, Spring & Summer.

**GEO****GEO 104. Introduction to Geospatial Technology and Analytics. 3 Credits.**

This course develops critical thinking skills through the exploration of the fundamental components of data analytics in terms of spatial data and geospatial technologies. This includes the basic concepts and skills related to the 3 core areas of analytics, 1) data, 2) analysis, and 3) visualization. Data structures and skills are examined within the context of Geographic Information Systems (GIS). Spreadsheets, database tools, GIS software, and geospatial technology are used to capture, manage, and store spatial data. Analysis tools, such as spreadsheet functions, scripts, and GIS software are used to investigate data sets related to discipline-specific projects. Geovisualization of results are communicated using map applications, dash boards, and story maps.

Gen Ed Attribute: Science Distributive Requirement.

Distance education offering may be available.

Typically offered in Fall, Spring, Summer, Winter.

**HEA****HEA 258. Introduction to Epidemiology. 3 Credits.**

This course introduces students to applications of epidemiologic methods and the procedures used in the study of the distribution and determinants of health and diseases, morbidity, injuries, disability, and mortality in populations. The use of epidemiologic methods for the control of conditions such as infectious and chronic diseases, mental disorders, community and environmental health hazards, and unintentional injuries will be discussed along with some quantitative aspects of epidemiology.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

**HON****HON 122. Computer Science for Social Justice. 3 Credits.**

Introduction to the fundamentals of computing and how they can be used by leaders to help enact social change. Topics include surveys of the following sub-areas of computer science: artificial intelligence, hardware/operating systems, programming languages/software, ethics/social issues, history, electronic communications, problem solving, and programming. The course includes laboratory projects in application software, programming, and electronic communication. A central theme of the course will be an examination of the mapping between past and future technological innovation and civic change. Such examination will challenge students to learn ways leaders can use computer science to promote social justice. Consent: Permission of the Department required to add.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall.

**HON 314. Science, Technology, and Environmental Systems. 3 Credits.**

Impact of technology and the environment as forces of influence on communities. The lab course will combine a historical overview with a contemporary focus on ways the science community is developing and regulating ideas for the future. Laboratory field experiences will involve data collection and observation in a variety of environmental contexts.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Spring.

**NTD****NTD 303. Introductory Principles Human Nutrition. 3 Credits.**

This course introduces students to the biochemical, physiological, and microbiological basics of human nutrition. Topics include the scientific method; dietary guidelines; digestion, absorption, metabolism, and use of carbohydrates, lipids, and proteins; food sources and functions of vitamins and minerals; and the relationship between nutrition and health.

Gen Ed Attribute: Science Distributive Requirement.

Distance education offering may be available.

Typically offered in Fall, Spring & Summer.

**PHI****PHI 125. Theology & Science: Enemies or Partners?. 3 Credits.**

An inquiry into the relationship of theology to the natural sciences. Team taught by both a physicist and a philosopher, the course investigates how ideas of God have been affected by advances in physics and biology.

Gen Ed Attribute for Students Admitted Prior to Fall 2020: Humanities Distributive Requirement, Science Distributive Requirement.

*Gen Ed Attribute for Students Admitted Fall 2020 and After: None.*

Typically offered in Spring.

Cross listed courses PHI 125, PHY 125.

**PHY****PHY 100. Elements of Physical Science. 3 Credits.**

A study of motion, energy, light, and some aspects of modern physics.

Gen Ed Attribute: Science Distributive Requirement.

Distance education offering may be available.

Typically offered in Fall & Spring.

**PHY 105. Structure of the Universe. 3 Credits.**

A survey of phenomena and objects in the universe from the very smallest distance scales to the grandest in the cosmos. Includes a historical consideration of the developments of modern theories of the physical world.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

**PHY 123. Food, Fire, and Physics: The Science of Cooking. 3 Credits.**

An exploration of food and cooking from a physical science perspective. Principles of soft matter physics (e.g. phase diagram, intermolecular forces, viscosity, diffusion, self-assembly, polymer physics) are discussed and used to gain insight into food and cooking.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

**PHY 125. Theology and Science: Enemies or Partners. 3 Credits.**

An inquiry into the relationship of theology to the natural sciences. Team taught by both a physicist and a philosopher, the course investigates how ideas of God have been affected by advances in physics and biology.

Gen Ed Attribute for Students Admitted Prior to Fall 2020: Humanities Distributive Requirement, Science Distributive Requirement.

*Gen Ed Attribute for Students Admitted Fall 2020 and After: None.*

Typically offered in Spring.

Cross listed courses PHI 125, PHY 125.

**PHY 130. General Physics I. 4 Credits.**

An introductory, noncalculus, physics course. Mechanics of solids and fluids, wave motion, heat and temperature, thermodynamics, and kinetic theory.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall, Spring & Summer.

**PHY 170. Physics I. 4 Credits.**

An introductory laboratory-based course. Includes mechanics, waves, heat, and thermodynamics. The laboratory emphasizes error analysis, the writing of technical reports, and data analysis using computers. A laboratory section must be added along with the lecture and discussion.

Pre / Co requisites: PHY 170 requires a prerequisite of MAT 161 OR a prerequisite of MAT 143 or MAT 145 and a corequisite of MAT 161.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

**SCI****SCI 100. Climate Change. 3 Credits.**

This course provides an introduction to the science of climate change. Core topics include albedo, the greenhouse effect, the carbon cycle, and feedback mechanisms between these phenomena. Students will study past climates, climate models, and the impacts of modern climate change. Near the end of the semester students will discuss efforts to mitigate climate change. They conclude by briefly discussing the most widely adopted climate change policies. No previous experience with these subjects is assumed.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

**SCI 101. The Carbon Cycle. 3 Credits.**

An exploration of how the carbon cycle connects earth and life, through photosynthesis, respiration, decay, rock formation and weathering, and plate tectonics. Humans have altered the carbon cycle by burning fossil fuels. Students investigate the carbon cycle on the WCU campus and consider the implications for global warming.

Pre / Co requisites: SCI 101 requires students to be education majors only.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

**SCI 102. Electricity with Physical and Biological Applications. 3 Credits.**

An exploration of the physics of electrical circuits, the chemical basis of electricity as the flow of electrons, acid-base and oxidation-reduction reactions in chemical and in living systems, the electrical activity in the human nervous system, and connections between electricity and sensation and locomotion in humans.

Pre / Co requisites: SCI 102 requires that students be Education majors only.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall & Spring.

**SCI 103. Science in the Arts: Color and Music. 3 Credits.**

This class will be geared towards how science shows up in art and music. Students will initially study some basic physics principles such as force and motion, electric and magnetic fields, periodic oscillations, and wave properties. They will then introduce some biological and neuropsychological concepts as they begin to focus on light, optics and color, and the human eye. Next, students will focus on sound, sound production, sound perception, and the organization of sound into musical scales such that "music" can be constructed.

Gen Ed Attribute: Science Distributive Requirement.

Distance education offering may be available.

Typically offered in Fall & Spring.