

# EXPER DISCOVERY IN NAT WORLD (CCEX-SHU)

## CCEX-SHU 1 Principles of Life-From Cells to Organisms (2 Credits)

Principles of Life-From Cells to Organisms Co-req for CCEX-SHU 1 is CCEX-SHU 3 Fulfillment: Core Curriculum Science Experimental Discovery in the Natural World Courses.

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World

## CCEX-SHU 3 Explore the Cell: from Gene to Protein (2 Credits)

Explore the Cell: from Gene to Protein Co-req for CCEX-SHU 3 is CCEX-SHU 1. Fulfillment: Core Curriculum Science Experimental Discovery in the Natural World Courses.

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World

## CCEX-SHU 115 Experiments in Food Science (4 Credits)

In this laboratory course students will become familiar with various techniques, equipment, data analysis skills, best practices in lab safety and ideas common to chemistry laboratories and to experimental research. The course will also give students an overview of the chemical and physical properties of the major and minor food components including water, carbohydrates, minerals, vitamins and so on. The course is intended to introduce students to the applied aspects of food chemistry, chemical properties of food components and relationships between the chemical composition of foods and functional, nutritional, and sensory properties. Students will also learn how to use scientific instruments and acquire different laboratory skills and techniques to help them draw conclusions from observed facts. Fulfillment: CORE ED.

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World

## CCEX-SHU 116 Where the City Meets the Sea: Studies in Coastal Urban Environments (4 Credits)

*Typically offered Spring*

Over half of the human population lives within 100 km of a coast and coastlines contain more than two-thirds of the world's largest cities. As a result, the world's natural coastal environments have been substantially modified to suit human needs. This course uses the built and natural environments of coastal cities as laboratories to examine the environmental and ecological implications of urban development in coastal areas. Using data from multiple coastal cities, student teams use fieldbased studies and Geographic Information System (GIS) data to examine patterns and processes operating in coastal cities. This course uses the local terrestrial, marine, and built environments as a laboratory to address these issues, and team projects requiring field work form a core component of the learning experience. As part of the NYU Global Network University initiative this course is being offered simultaneously in several NYU sites globally and students are collaborating extensively with students from their sister campuses through the duration of this course. Fulfillment: CORE ED; Biology elective.

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Biology Elective
- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World

## CCEX-SHU 117 The Legacy of Tradition I: The Growth of Science in the West (4 Credits)

*Typically offered occasionally*

This course will consider the origins and development of science in the West. What ancient principles are preserved? Beginning with early Greek "proto scientific" philosophy we will explore emerging paradigms of science through a consideration and replication of great experiments that had significant impact by changing accepted world views. Before turning to the scientific and ontological revolution of the 16th and 17th centuries we will investigate the assumptions of pre-modern science. Philosophical, religious and scientific arguments will be studied and evaluated. Representative works of Bacon, Descartes, Galileo and Newton will be read to introduce the outlook of early modern science. The course will conclude with a survey of some contemporary scientific theories that evoke the legacy of tradition. One lecture and laboratory each week. In the lab students will, to the extent possible, replicate classic experiments from the history of science (list and descriptions of experiments in preparation). Fulfillment: general elective

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

**CCEX-SHU 118 The Legacy of Tradition II: Science and Technology in Pre-Modern China (4 Credits)***Typically offered occasionally*

This course will consider the origins and development of science and technology in China. What ancient principles are preserved? Beginning with such early theories as yin-yang and change (Yi Jing) we will explore emerging paradigms of science and technology. We will consider the practical outlook associated with the wide range of Chinese technologies and their relationship to the emergence of scientific thinking. The influence of Western scientific attitudes and accomplishments, especially as mediated through the Jesuit and Protestant missions to China, will be studied. A question guiding the course will be that of why the world's most advanced technological civilization in the pre-modern era failed to experience a scientific revolution. Were the premises of Chinese cosmology and philosophy resistant to the development of science? Were Chinese approaches to astronomy and mathematics, and the understanding of the phenomenon of life as represented in classics of Chinese traditional medicine, adverse to scientific methods? One lecture and laboratory each week. In the lab students will, to the extent possible, replicate classic experiments from the history of science and technology in China (list and descriptions of experiments in preparation). Fulfillment: general elective

**Grading:** Ugrd Shanghai Graded**Repeatable for additional credit:** No**CCEX-SHU 120 Biology for a Changing World (4 Credits)***Typically offered Fall*

This course introduces the principles and technologies of modern biology. It covers the cellular and molecular structure of organisms, how life works on the basis of energy and metabolism, and how life reproduces through cell division and inheritance. The course will provide an overview of the biological process from gene expression, epigenetic modification, cell cycle and differentiation, mutation and cancer, and the signaling pathways and mechanisms among the cells in a changing world. Prerequisite: None. Antirequisite: Students who have taken CHEM-SHU 125 Foundations of Chemistry I are not eligible. Fulfillment: CORE ED.

**Grading:** Ugrd Shanghai Graded**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World

**CCEX-SHU 122 Perception and the Brain (4 Credits)***Typically offered every year*

"How do humans and other animals obtain knowledge about the world?

It is easy to take perception for granted, but complex processes (only partly understood) underlie our ability to understand the world by seeing, hearing, feeling, tasting, and smelling it. This is not because the scientific study of perception is new. In fact, perception has fascinated philosophers, physicists, and physiologists for centuries. Currently, perception is a central topic in psychology, cognitive science, computer science, and neuroscience. How do scientists approach perception? We seek to discover lawful relations between perceptual experiences and the physical world and to develop models of the processes and mechanisms in the brain that produce these connections. In this course, in the lectures, we will discuss fundamental problems in perception (primarily vision), and in the lab sessions, you will learn about standard experimental methods and their use in the study of perceptual processes and to give you first-hand experience in conducting original research. As part of these activities you will learn to write experimental reports and to think critically about the relation between theory and experiment. You will also be exposed to the use of computers in perception research. Indeed, there will be considerable use of computers in the course, with part of the goal being to provide you with basic computer skills." Prereq: None Fulfillment: CORE ED; NS elective.

**Grading:** Ugrd Shanghai Graded**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World
- SB Crse Attr: NYU Shanghai: Neural Science Elective

**CCEX-SHU 136 Human Genetics: Genes in Human Health & Disease (4 Credits)**

Why do some diseases pass from one generation to the next in families?

Why are certain groups more susceptible to some genetic conditions?

Is there a way to change genes to avoid or cure genetic diseases? This course explores how inheritance, environment, experience and random errors affect the information encoded in our genes, how this "blueprint"

is interpreted by cellular machinery to build a complex human being, and how our heredity has resulted in our evolution. The lab part focuses

(1) to enhance and reinforce understanding of the concepts presented in the lectures and (2) to further develop problem-solving and critical-thinking skills. The labs generally use tactile, hands-on experiences to provide additional means toward learning concepts. Prerequisite: None.

Fulfillment: CORE ED

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World

**CCEX-SHU 137 Human Genetics: Genes in Human Health & Disease Lab (2 Credits)**

The Human Genetics: Genes in Human Health & Disease Lab is a laboratory course corresponding to the Human Genetics: Genes in Human Health & Disease lecture. The lecture is the pre- or co-requisite course for the lab. The overall aim of this course is to provide a basic understanding, geared especially to non-biologists, about the biological mechanisms of genetics. In particular, this lab course focuses on the "hands-on", active learning opportunities provided by the laboratory component. There are two main purposes of the lab: (1) to enhance and reinforce understanding of the concepts presented in the lectures and (2) to further develop problem-solving and critical-thinking skills. The labs generally use tactile, hands-on experiences to provide additional means toward learning concepts. Fulfillment: CORE ED (with CCEX-SHU 136)

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World

**CCEX-SHU 170 While You Were Sleeping (4 Credits)**

*Typically offered every year*

In this course, we will explore the mysterious and largely uncharted world of sleep and dreams. We will question many of our most basic assumptions and biases about the role of sleep in our lives and discover the importance of sleep in optimizing our physical and mental health. This course will be broken into five major themes: (1) Defining sleep; (2) dreams; (3) the evolution of sleep; (4) sleep regulation; and (5) sleep disorders and treatment. The lab portion of this experimental discovery course will guide students through various aspects of the experimental process including informed consent, data collection and interpretation, and applying evidenced-based strategies to improve sleep. Prerequisite: None. Fulfillment: Core Curriculum Science Experimental Discovery in the Natural World Courses.

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World

**CCEX-SHU 203 Energy and the Environment (4 Credits)**

*Typically offered occasionally*

This course explores the scientific foundations of current environmental issues and their implications for public policy. The syllabus is divided into sections that each examines a current environmental theme in depth. The first sections investigate the composition of the atmosphere and the chemical processes that cause air pollution, ozone depletion, and global warming. Moving to the study of water, the course explores the properties of this unique solvent and the effect of various aqueous pollutants. The course also includes an investigation of energy from chemical reactions, our continuing reliance on fossil fuels, and the potential of alternative energy sources. The laboratory experiments are closely integrated with the lecture topics and provide hands-on explorations of central course themes. Throughout the course we also will examine how scientific studies of the environment are intimately connected with political, economic and policy concerns. Fulfillment: Core Curriculum Science Experimental Discovery in the Natural World Courses.

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World

**CCEX-SHU 214 How Things Work (4 Credits)**

*Typically offered Spring*

All of the devices that define contemporary living are applications of basic scientific discoveries. The principles underlying these devices are fascinating as well as useful, and explain as well many of the natural features and phenomena of the world around us. This course familiarizes you with some basic principles of physics through their applications to selected devices such as CD and DVD players, radio and cell phones, the basic electronic components of computers, lasers and LEDs, and even nuclear weapons. In learning the basic physics behind these modern inventions, you will develop a deeper understanding of how the physical world works and gain a new appreciation of everyday phenomena that are ordinarily taken for granted. The course is designed for non-science students with an interest in the natural world. The basic physical ideas needed to understand how things operate are presented using some mathematics, but none beyond elementary high school-level algebra. Prerequisite: None. Fulfillment: CORE ED

**Grading:** Ugrd Shanghai Graded

**Repeatable for additional credit:** No

- SB Crse Attr: NYU Shanghai: Experimental Discovery in the Natural World