

## COURSE DESCRIPTIONS

### WCSAM 103 Counting Votes

4 CREDITS

After eighteen years of waiting, you finally have the right to vote! But just what does voting mean? There are actually many methods of expressing voting preferences via ballots. Which is the best method? How is a state's number of representatives in the U.S. House of Representatives actually determined? What other methods are there, and what results would they produce? How might that change the political landscape of our country? Which states have real power within the Electoral College? We will take a mathematical look at all of these questions by studying Arrow's Impossibility Theorem, exploring various apportionment methods and their implications, and learning about power within weighted voting systems. (WCore: WCSAM and QE)

### WCSAM 104 Explorations in Oceanography

4 CREDITS

This course will take an interdisciplinary approach to exploring oceanography, marine ecology, and how anthropogenic activities influence the ocean. We will study key aspects of physical, biological, and chemical oceanography in order to gain an integrated and comprehensive understanding of the oceans. This course will include multiday experiments and labs in which students will explore concepts such as what physical factors control ocean circulation, what influences biological primary production, the chemistry behind ocean acidification, and how ocean acidification impacts different classes of phytoplankton. Group activities will often utilize real oceanographic, remote sensing, and time series data to explore relationships, long term trends, and periodic events, such as El Nino. (WCore: WCSAM and QE)

### WCSAM 105 Games and Decisions

4 CREDITS

In a situation where the outcome depends on several people's decisions, how can you make the best rational decision? That is the central question of Game Theory, used in economics, political science, biology and many more fields. In this experiential course, students will discover the principles of Game Theory by playing and analyzing a variety of 'games'. The games analyzed will include Deterministic, Strategic and Coalition Games. (WCore: WCSAM)

### WCSAM 109 Introduction to Circuits and Electronics

4 CREDITS

This is a hands-on course where students build practical electronic devices and learn basic electronics and electric circuits. (WCore: WCSAM and QE)

### WCSAM 112 How to Manage Money in Your Twenties

3 CREDITS

This course presents the student with practical solutions to the contemporary issue of a debt laden society whose populace lacks the financial skills to properly manage their finances. The course discusses the key components of financial planning - wealth protection, accumulation, and distribution. Practical application and experimentation of financial principles will be applied to money management, insurance, credit, investing, and the financial marketplace. Implementation of the principles taught and skills learned in this course will allow students to find success in their personal finances. (WCore: WCSAM and QE)

### WCSAM 113 Probability, Risk, and Reward

4 CREDITS

An engaging introduction to probabilistic thinking through the exploration of games of chance, cognitive biases, applications in business, health, and science, and fascinating episodes in the history of probability. (WCore: WCSAM and QE)

### WCSAM 114 Science of Food and Drink

3 CREDITS

Food and drink are central to living and this culinary course takes a chemistry approach to the study of how different foods and drinks are created. During this highly interactive course, students will learn fundamental principles in chemistry and then use them to create various foods and drink. Topics such as chemical composition, chemical bonding, chemical interactions, chemical properties and chemical reactivity will be explored using chemicals and biological organisms common in a kitchen. Concepts will be studied through experimentation using the kitchen as the laboratory environment. During the course, other important and sometime controversial food science topics will be discussed. Additionally, examples and illustrations pulled from recent events will be given to heighten the general awareness of other chemicals present in society and the benefits and risks associated with their use. (WCore: WCSAM)

### WCSAM 116 Introduction to the Universe

4 CREDITS

This course will introduce students to the field of astronomy, starting with students reproducing the ancient insights into the motions of the sun, moon, planets, and stars, and continuing through new modern discoveries such as dark matter and extrasolar planets. Emphasis is placed on the physical

properties of light and how it is used to observe the universe beyond our physical reach. Throughout the course, we will discuss the interaction of astronomy and culture, and what makes science different from other ways of knowing. (WCore: WCSAM and QE)

### WCSAM 201 Geobiology of the Universe

4 CREDITS

This course explores the interdisciplinary methods of space exploration and the extraordinary data that we accrue through Earth analogs, remote sensing, crewed missions, and uncrewed probes into our solar system and beyond. Using primary data from past studies and current missions, we will develop models and design experiments to ask larger questions about the Universe. Is there life beyond Earth? How does geology of a space body inform the potential for life? (WCore: WCSAM and RE)

### WCSAM 202 Isotope Biogeochemistry

3 CREDITS

This course will use a case study approach to understand how the use of isotopic ratios and isotopic tracers have been employed to answer a wide range of questions about the earth and our universe. Students will read, present, and discuss seminal research articles from the primary literature that have used isotopes to answer important scientific questions. Topics covered will be drawn from across all environmental related fields, and will include the use of isotopes to: date the earth and our solar system, determine bird migration patterns and breeding grounds, determine the diet and trophic status of various organisms in an ecosystem, determine the source of toxic heavy metals, characterize the composition of the earth's atmosphere in the distant past, characterize ocean circulation and groundwater flow, etc. Students will learn how isotope measurements are made using mass spectrometers both at Westminster and at multiple isotope labs at another institution on a class field trip. Students will analyze real data from these facilities in order to answer a current research question, and will later present their findings and conclusions. (WCore: WCSAM and QE)

### WCSAM 203 Linear Algebra

4 CREDITS

Linear algebra is a foundational subject for almost all areas of pure and applied mathematics. This course will include systems of linear equations and their representations as matrices, matrix algebra, vector spaces and subspaces in  $R^n$ , eigenvalues and eigenvectors, least squares, and the simplex method. There will be a heavy emphasis on applications and numerical techniques, implemented with standard scientific programming languages. This course emphasizes critical, analytical, and integrative thinking as well as writing and other communication skills. This course does not have a specific prerequisite, but students enrolling in this course need to be ready for college-level mathematics. (WCore: WCSAM)

### WCSAM 206 Making and Breaking Secret Codes

4 CREDITS

The purpose of this course is to introduce you to the complex and exciting world of secret communication. Starting with the ciphers used by Julius Caesar, we will trace the development of cryptography (the science of enciphering messages) and cryptanalysis (the science of breaking ciphers and decoding secret messages) through the medieval period, the Enigma machine and WWII, and the computer age. We will develop a hands-on understanding of the computer-based encryption that keeps our credit card numbers safe online and allows us to transmit information securely over great distances. (WCore: WCSAM and QE)

### WCSAM 207 The Art & Science of Creativity

3 CREDITS

Creativity is significant in the design of both artistic creations and scientific experiments. Both science and the arts are process-driven and employ problem-solving techniques. Both have a history of work in the field, from collecting specimens to plein air painting. Both have a history of work indoors, from labs to studios. Whether one's lens is that of a camera or a microscope, observation is the same process. The course takes an interdisciplinary look at the creative process, turning parallels into intersections. We will focus on current research in creativity and, through experiential discovery, tap our own ability to design and experiment. (WCore: WCSAM)

### WCSAM 208 Citizen Science Astronomy Research

3 CREDITS

In this course, students will use robotic telescopes to take astronomical images, analyze the data in these images, and contribute their findings to an ongoing collaborative citizen science research project. Possible objects of study will vary depending on timing, but may include variable stars, eclipsing binaries, exoplanet transits, or asteroids. Students will also choose their own citizen science project in which to participate and share their project with others. Throughout the course, we will focus on the critical thinking skills

and processes in scientific research, how the modern scientific enterprise operates, and how science is communicated to the public. (WCore: WCSAM)

**WCSAM 400 Science Capstone 2 CREDITS**

In this capstone seminar, students will extend their learning about a STEM (science, technology, engineering, and mathematics) topic of interest, improve skills in scientific communication and develop a creative portfolio by completing an interdisciplinary capstone project. Students will design and conduct literature research on a STEM topic of their choosing, design and prepare a professional scientific communication, present their work on campus at the Undergraduate Conference and identify a source to publish their scientific work to the larger community. This course provides the opportunity for students to begin a research project or can complement a project they have already begun within a variety of STEM majors. This course satisfies the WCore capstone requirement. (WCore: SC)