

# WCore

## WCore SCIENCE AND MATHEMATICS COURSES

### WCore Requirements

<b>CMPT</b>	<b>140</b>	<b>Computer Science Principles</b>	<b>3 Credits</b>
This course is an introduction to the history, social implications, great principles, and future of computing. Relevance of computing to students and society will be emphasized. Students will learn the joy of programming a computer using a friendly, graphical language, and will discuss how computing empowers discovery and progress in other fields. (WCore: WCSAM)			
<b>CMPT</b>	<b>150</b>	<b>Math and Technology of Entertainment Arts</b>	<b>3 Credits</b>
Explore the math and technology behind compute animation and video game design. Ever wonder while watching a movie: "How did they do that?" Students will learn the mathematical and computational theory behind image processing, 2D and 3D computer graphics and special effects. This seminar will discuss the progress of computer graphics research over the last fifty years. (WCore: WCSAM, QE)			
<b>DATA</b>	<b>110</b>	<b>Explorations in Data Science</b>	<b>4 Credits</b>
Data Science is on the forefront of the Big Data Revolution. Governments, companies, nonprofits, and health care providers are collecting, storing, and analyzing vast amounts of data to extract information about us and make predictions about our lives. The mathematical and technological aspects of data science have been central to its success, yet they cannot exist in isolation. The context in which data is collected and used, and potentially misused, shape the impact on individuals and society as a whole. Therefore, the study of issues involving data collection, analysis, and its communication from multiple contexts involving different disciplines-including but not limited to economics, psychology, sociology, biology, medicine and chemistry-will be a central theme of this class. (WCore: WCSAM, QE)			
<b>ENVI</b>	<b>102</b>	<b>Ecology of Food Systems</b>	<b>4 Credits</b>
We eat many times a day, but very few of us think about our meals as part of a complex system of interactions between plants, animals, people, machines, and institutions. In this course we will explore the current state of the US food system, from production to consumption as well as issues such as food waste and food insecurity. Through hands-on experiments, guest experts and field visits, we'll also learn about the many ways that folks are working to create new food systems that are more just, fair and ecological. This course will also introduce students to the hands-on skills essential for sustainable agriculture on a variety of scales. On some days, participants should come to class dressed to do garden work and expect to get their hands dirty, as well as spend time visiting several area farms and gardens. Students will have the opportunity to implement what they learn while working in Westminster's campus garden and in cooperation with community partners. (WCore: WCSAM, QE)			
<b>ENVI</b>	<b>115</b>	<b>Science of the Environment</b>	<b>4 Credits</b>
In this course, you will get hands-on opportunities to learn about many critical aspects of our environment the soil that produces the food we eat, the air we breathe and the water we drink, as well as the climate of the planet we call home. You will have the opportunity to learn how these important environmental systems work, as well several techniques and tools to collect, analyze, and interpret environmental data. A major goal of the course is to help you understand the science behind many environmental issues so that you can make informed decisions about important environmental and global challenges. (WCore: WCSAM, QE)			
<b>GEOL</b>	<b>107</b>	<b>Geology of the American West</b>	<b>4 Credits</b>
This class uses case studies in Western North America to introduce students to the field of geology. Through investigations of the Pacific Northwest, the Colorado Plateau, the Wyoming Craton, and the Wasatch Mountains, students will learn the theories and concepts that geologists use to understand our entire planet. Be warned: this class will change the way you see the world. (WCore: WCSAM, QE)			
<b>GEOL</b>	<b>111</b>	<b>National Parks Geology</b>	<b>4 Credits</b>
Many of America's National Parks were designated because of their geologic beauty and history. This course will examine geologic principles and concepts through the lens of National Park Service units, as they often represent the most exquisite examples of geologic phenomena. Geology within national parks tells a story of the evolution of North America, from mountain building, to volcanism, to historic inland seas and giant beasts of an earlier geologic age. (WCore: WCSAM, QE)			
<b>GEOL</b>	<b>230</b>	<b>Dinosaur Paleobiology</b>	<b>4 Credits</b>

They say you can't get blood from a stone, but paleontologists often try to do exactly that. With nothing but a few fossilized fragments, paleontologists reconstruct not just the anatomy of extinct creatures, but also their physiology, behavior, ecology, and life histories. This class will use dinosaurs as an extended case study to explore how paleontologists make claims about the lives of long dead creatures, and about how understanding those creatures' lives can lead to additional insights about the history of the earth and the dynamics of evolution. (WCore: WCSAM)			
<b>NEURO</b>	<b>117</b>	<b>Yep, Brains Are Cool!</b>	<b>4 Credits</b>
In this course, we will explore a variety of topics important to anyone who owns and uses a brain. In particular, we will focus on brain development in late adolescence and emerging adulthood and will use our brains to understand how we research brains. The course will be framed around a central question - "How do we know that?" We will look at current research on brain development during the transition to young adulthood, examine strengths and weaknesses of methods used to conduct that research, and discuss the practical application of such knowledge to the students' own lives. In addition, we will discuss the ways in which said research has been used to shape parenting and educational practices as well as public policy over the past decade. (WCore: WCSAM, RE)			
<b>NEURO</b>	<b>120</b>	<b>Genetics of Human Behavior</b>	<b>4 Credits</b>
Have you ever wondered how much your genes affect who you are? This course is an exploration of the role of genetic inheritance on human behavior. We will focus on modern genetic analysis and the molecular techniques used to study both complex normal human behaviors and diseases. Lab exercises, data analysis, and case studies will be integrated throughout to familiarize students with the process and methods of science. (WCore: WCSAM, QE)			
<b>NURS</b>	<b>108</b>	<b>Healthy, Sustainable Nutrition</b>	<b>4 Credits</b>
The course includes the foundations of human dietary requirements, the basics of macronutrients and micronutrients, and nutritional needs across the lifespan needed for a pre-health occupation prerequisite. The primary prevention of the chronic diseases of first world populations, versus the needs of those of the third world will be compared and contrasted for the purpose of exploring complex issues of nutrition, food, health and environmental sustainability. Grounded in concepts of nutrition science and human ecology, the course will explore the impact of food production and consumption on human health and the environment. Deep learning is achieved through involvement in hands-on activities and assignments. (WCore: WCSAM)			
<b>PSYC</b>	<b>105</b>	<b>Bust That Psych Myth</b>	<b>4 Credits</b>
This course provides a foundation and hands-on experience in the scientific study of human emotion, cognition and behavior. Through this exploration, the course presents students with opportunity to interact with material in ways that help them understand the context of psychology as a behavioral science among other fields that focus on human behavior (both individual and group) culture, and society, and the context of psychology among other sciences. Other issues discussed will be myths about popular psychology, the effect those myths have on the general public, and how broader society's denial of research findings may be caused by deficits in scientific literacy. (WCore: WCSAM, RE)			
<b>WCSAM</b>	<b>103</b>	<b>Counting Votes</b>	<b>4 Credits</b>
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, QE)			
<b>WCSAM</b>	<b>104</b>	<b>Explorations in Oceanography</b>	<b>4 Credits</b>
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 Niño. (WCore: WCSAM, QE)			
<b>WCSAM</b>	<b>105</b>	<b>Games and Decisions</b>	<b>4 Credits</b>
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)			
<b>WCSAM</b>	<b>109</b>	<b>Introduction to Circuits and Electronics</b>	<b>4 Credits</b>
This is a hands-on course where students build practical electronic devices and learn basic electronics and electric circuits. (WCore: WCSAM, QE)			

<b>WCSAM</b>	<b>112</b>	<b>Personal Wealth Foundations</b>	<b>3 Credits</b>
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, QE)			
<b>WCSAM</b>	<b>113</b>	<b>Probability, Risk, and Reward</b>	<b>4 Credits</b>
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, QE)			
<b>WCSAM</b>	<b>114</b>	<b>Science of Food and Drink</b>	<b>3 Credits</b>
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)			
<b>WCSAM</b>	<b>116</b>	<b>Introduction to the Universe</b>	<b>4 Credits</b>
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, QE)			
<b>WCSAM</b>	<b>201</b>	<b>Geobiology of the Universe</b>	<b>3 Credits</b>
This course explores the interdisciplinary methods of space exploration and the extraordinary data that we accrue through Earth analogs, remote sensing, crewed missions, and non-crewed 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? This course fulfills the Research Emphasis (RE) requirement. (WCore: WCSAM, RE)			
<b>WCSAM</b>	<b>202</b>	<b>Isotope Biogeochemistry</b>	<b>3 Credits</b>
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 College 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, QE)			
<b>WCSAM</b>	<b>203</b>	<b>Linear Algebra</b>	<b>4 Credits</b>
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)			
<b>WCSAM</b>	<b>206</b>	<b>Making and Breaking Secret Codes</b>	<b>4 Credits</b>
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, QE)			

<b>WCSAM</b>	<b>207</b>	<b>The Art and Science of Creativity</b>	<b>3 Credits</b>
<p>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)</p>			