

## July 11 - August 11, 2020 Course Packages

Enhance your learning experiences with study in an international setting in Vancouver, BC Canada!

We welcome each university to organize students to study course packages in the beautiful campus of the University of British Columbia. Many course packages have a minimum and maximum class size, so we encourage you to register early. Course packages that do not have the minimum number of students will not be offered, but students may transfer to other packages. Courses do not receive UBC credit but credit may be granted by the student's home university (at its discretion).

**Please note:** the deadline for registrations for the **July 11 - August 11, 2020** program is **March 30, 2020**. Students must be at least 18 years of age at the start of the program to be eligible to apply.

### Applied Science - Chemical and Biological Engineering >

#### Package A - Introduction to Chemical and Biological Engineering (CHBE A JULY)

##### **The Power of Chemistry: An Introduction to Matter, Energy, and Chemical Engineering**

Matter and energy are the building blocks of our universe. Using their understanding of these concepts, chemical engineers re-organize and transform matter and energy to produce new substances and materials. From the pharmaceuticals we take when we are sick, to the fuel we put in our vehicles, to the plastics, alloys and polymers that we find in our homes, in our phones and virtually everywhere around us, chemical engineers are involved, combining their technical skills with their understanding of social, economic and environmental factors. This course provides an introduction to the chemical engineering discipline, first by providing an overview of the physical processes and laws involved in the conversion of raw materials into refined products, and secondly by applying these concepts into more practical applications and designs. Students will have the opportunity to perform laboratory experiments illustrating some key concepts, and also establish connections with newly acquired theory by visiting operating industrial facilities in the Vancouver area. This is an introductory course, and no prior knowledge of chemical engineering is therefore required.

##### **The Power of Biology: An Introduction to Biological Engineering**

Science has advanced to the extent that humankind now asserts its dominion over the very building blocks of life. Engineers are at the forefront of the efforts to harness the power of biological systems to develop new technologies, materials, medical tools and treatments, foods, industrial products and environmental processes to improve the world around us. This course provides an introduction to biological engineering. It includes introductions to the fundamental concepts of microbiology, cell biology, genetic engineering, and bioprocessing, before exploring more specialized topics like the production of biofuels, novel foods and pharmaceuticals, biomaterials, and recent advances in biotechnology. Humans are faced with new ethical quandaries with these astounding technological advances, and so the ethics and social aspects of bioengineering are also discussed. Participants will have the opportunity to apply theory into practice through lab experiments, including the genetic engineering of bacteria, and to witness bioprocessing and sustainable design in action through visits of industrial facilities and a biological waste treatment plant in the Vancouver area. This is an introductory course, and no prior knowledge of biochemistry or biological engineering is required.

#### Package B - The Science and Engineering of Beverage Production (CHBE B JULY) .(#accordion-100b)

##### **The Science and Engineering of Coffee Production**

For many of us, coffee magically appears every morning at the press of a button or served by a smiling barista at our favourite café. Chemical engineers, however, see coffee as the product of a series of physical and chemical processes through which coffee beans, picked from a plant, are converted into the delectable beverage we all enjoy. This course introduces the scientific and engineering concepts that go into coffee production. Each step of the production process will be studied, and the underlying physical and chemical phenomena involved will be explored, from the cultivation of the plants, through the heat and mass transfer involved in roasting, drying and brewing, and through the engineering considerations that go into the design of coffee machines and cups, all while considering engineering, economic, sustainability, and ethical factors. Students will gain hands-on experience in process engineering through relevant laboratory experiments during which they will develop their own coffee blend and compete against their classmates to see who can make the best product! They will also have the opportunity to see the process in action on a large scale by visiting a local coffee roaster, and, of course, sample delicious coffees from all over the world.

This course takes a technical look at coffee production, and so familiarity with basic calculus, chemistry, and physics is recommended.

#### **The Science and Engineering of Beer and Wine Production**

We've come a long way since beer was first brewed in Mesopotamia 6000 years ago, and today we can easily purchase beer boasting a boundless diversity of flavours and styles from all over the world. Wine, beer's much younger cousin brewed for the first time a mere 4000 years ago, continues to this day to evoke images of mystery and romance and serve as inspiration for songs and poems. Chemical engineers, however, though many remain romantic at heart, see beer and wine as the result of a series of physical, chemical and biological processes that convert the sugars in fruits and grains into the beverages enjoyed by many. This course presents the fundamentals of chemical and biological engineering through the study of these processes, exploring industrial microbiology, fermentation, filtration, distillation and carbonation. Underlying principles and disciplines, including cell culture, bioprocessing, heat and mass transfer, and phase separation will be studied in detail, both in the classroom and in hands-on laboratory experiments, along with discussions on economics and market analysis, and environmental sustainability. Participants will visit industrial breweries to establish links between theory and practice, and sample beers and wines from all around British Columbia, which is well known the quality and diversity of its products. This course is a technical introduction to bioprocess engineering, and familiarity with calculus, chemistry, and physics is therefore suggested.

All participants must be at least 19 years of age.

#### Package C - Thinking like an Engineer: An Introduction to Experimental Design, Data Collection, and Analysis (CHBE C JULY) (#accordion-100c)

##### **Introduction to Computer-Assisted Problem-Solving**

Computers have come a long way over the last few decades and now impact virtually every aspect of industry, business and society. Engineers have been able to take advantage of advances in these technologies by using computers to solve complex problems that were previously impractical or even impossible to solve. This course examines how computers solve problems. Various methods and computational tools will be applied to engineering problems in chemical and pharmaceutical production, energy generation, and engineering design. This course will focus on how to formulate problems that engineers and others face every day, into language and commands that computers can understand. The application of numerical analysis techniques to a variety of systems will be explored, and tools that make problem-solving efficient, fast, and reliable will also be introduced. The tools presented in this course are applied to the content in the *Experimental Design and Data Analysis* course in this package, providing participants with a comprehensive overview of the data collection and analysis process that is applicable to virtually all fields of study in science and engineering. Everyone is welcome and no prior experience in computer programming is required.

##### **Introduction to Experimental Design and Data Analysis**

In both academia and industry, scientists and engineers routinely perform bench- and pilot-scale laboratory investigations. Hidden behind the experiments performed, however, is a considerable amount of time and energy that must be dedicated to the design of efficient and useful experiments, that will provide the data required to accomplish experimental objectives, as well as the time and expertise required to properly analyze that data to extract useful and reliable information, all of which are crucial skills for scientists and engineers. In this course, students will learn the fundamentals of experimental design and analysis; from the use of factorial design to test multiple variables, to the use of experimental controls, and will acquire thorough experience in designing appropriate experiments to effectively test scientific hypotheses. The appropriate analysis techniques for understanding the data collected from experiments, as well as how to graphically and statistically present this data will be explored, helping students to confidently draw conclusions from experiments. Computer-aided experimental design tools, supplementing the concepts presented in the other course in this package, will also be introduced. Finally, students will have the opportunity to design and perform their own unique experiments, and present their data to their peers. Everyone is welcome, and no prior experience in statistics or experimental design is required.

#### Package D - Green Engineering (CHBE D JULY) (#accordion-100d)

##### **Out With the Old, In With the Renewable: An Introduction to Renewable Energy**

Decreasing fossil fuel reserves and the need to mitigate the effects of climate change are pushing us to develop and implement technologies for the production of renewable, carbon-neutral energy. Over the last decade, exciting advances have been made not only in solar and wind power generation, but also in the development of less traditional renewable energy sources, such as biomass-derived fuels, geothermal and tidal power generation technologies, and active materials. This course explores the science and engineering behind renewable energy technologies and discusses recent advances and future research directions for their further development. Beyond technical details, the social and economic contexts of renewable energies are also explored. The shift to renewable energy is a truly global phenomenon, and an exciting field involving scientists and engineers working together. In this course, students will get hands-on experience with different technologies, visit power generation and waste-to-energy facilities in the Vancouver area, and will share their ideas with classmates and faculty members during research presentations. Although technical material will be covered, no specific technical background is necessary, and the course is open to anyone interested in renewable energy.

## It's Not Easy Being Green: An Introduction to Green Chemistry and Green Engineering

Science and engineering continue to allow humanity to push the boundaries of what is possible, and to accomplish wondrous and previously unimaginable things. The downside of many of our greatest technological advances, however, has been the generation of pollution in various forms. From non-degradable plastics and microplastics accumulating in our oceans to the chemicals and synthetic hormones now found in our water sources, to contaminants and greenhouse gases accumulating in the air we breathe, we now, as a species, face important new challenges. We have the opportunity to rethink our approach to development and to adopt practices that will minimize the environmental impact of our activities. This course explores the immediate challenges we face in managing and minimizing pollution and waste, and discusses the 12 principles of green chemistry and engineering that scientist and engineers must consider when developing new technologies and designs. The focus will be placed on water and air pollution, the technologies available for their management, principles of sustainable development and waste minimization, and environmental impact assessment through tools like life-cycle analysis and environmental system analysis. Students will discuss their ideas with classmates and faculty members during research presentations and will have the opportunity to visit industrial facilities that integrate green policies and processes into their operations. Although technical material will be covered, no specific technical background is necessary, and the course is open to anyone interested in green technology.

## Applied Science - Civil Engineering >

### Package A - Computer Software Applications in Civil Engineering (CIVL A JULY) (#accordion-101a)

#### **Computer Applications in Civil Engineering**

An introduction to spreadsheets, equation-solving software, and computer-aided graphic design tools used when solving civil engineering problems. Introduction to basic structural analysis, approximate analysis of structures, and calculation of forces, stresses, and displacements using common industrially available computer software. The course focuses on the introductory topics in civil engineering design processes, graphical visualization of civil infrastructures, and use of computational tools in civil engineering, providing an overview on the applications of computer software tools in civil engineering. The course is a combination of lectures and hands-on lab sessions, and it may include presentations from industry personnel and civil engineering software developers.

#### **Laboratory Projects in Computer Modeling and Analytics**

The course runs in a computer laboratory and includes introductory lessons and tutorial sessions, covering some of the commonly used basic civil engineering computer programs in both industrial projects and academic research. These include software for data acquisition, signal processing, numerical analysis, and analytical studies, such as Excel, Mathcad, MATHLAB, RISA, ETABS, SAP2000, and S-FRAME. In addition, the course introduces some of the basic engineering software for graphical visualization of civil infrastructures, such as Visio, SketchUp and AutoCAD. The laboratory course demonstrates the implementation of concepts/applications discussed during the lectures, and the students will learn the capabilities of the latest computer software for civil engineering analysis. Throughout the course, simple example problems will allow the students to implement the concepts discussed during the lectures. Time will be available during the lab sessions to discuss specific engineering problems that the students may want to model with one of the software packages.

Preferred background in Civil Engineering or related field.

### Package B - Structural Materials (CIVL B JULY) (#accordion-101b)

#### **Structural Materials**

The structure and properties of common Civil Engineering materials: aggregates, Portland cement concrete, asphalt concrete, steel, wood, and timber. The emphasis is on the relationship between the structures of these materials and their mechanical properties and durability. The course will include field visits to construction sites and may include presentations from industry personnel.

#### **Laboratory Testing of Structural Materials**

Some topical problems will be identified in the performance of structural materials, such as Portland cement concrete, asphalt concrete, geopolymer, timber and steel. In groups students will carry out laboratory and field experiments to study the structural materials involved. It is a laboratory-based course where site visits and external consultations are an integral requirement.

Preferred background in Civil Engineering or related field.

### Package C - Concrete Technology (CIVL C JULY) (#accordion-101c)

#### **Advanced Topics in Concrete Technology**

This course focuses on the advanced topics in concrete technology, addressing the current practices and the associated issues, covering smart materials for new constructions and repair of existing civil infrastructures. The course would introduce specialized concretes such as Fiber Reinforced Concrete (FRC) and High Performance Concrete (HPC), shotcrete, etc. In addition, topics discussed include advanced mineral and chemical admixtures to be used in modern concrete, as well as understanding the mechanical response of advanced concretes and their durability aspects. The course will include field visits to construction sites and may include presentations from industry personnel.

#### **Experimental Studies of Structural Concrete Elements**

In groups students carry out experimental work on structural concrete elements: beams, girders, and columns with different reinforcements or repairs. It includes testing, analysis and computer modeling. This is a laboratory-based course where site visits and external consultations are an integral requirement.

Preferred background in Civil Engineering or related field.

## **Applied Science - Electrical and Computer Engineering >**

### Package A - Introduction to Electrical and Computer Engineering (ELEC A JULY) [\\_\(#accordion-102a\)](#)

#### **Introduction to Digital Technology and Smart Devices**

New products (smart-home devices, portable electronics, cars, appliances) are getting more intelligent and more connected. Do you ever wonder what technology lies behind them? This course covers the fundamental ideas behind smart devices and modern electronics. We will study the building blocks of digital electronic systems, including small microcomputers, and how they interface with us. Our exploration will involve the design and implementation of machines that can read signals from the real world and make decisions digitally. This course will introduce the basics of microcontroller programming to perform smart tasks; additionally, it will cover how different peripherals and sensors are used to communicate, and how the information they collect is stored. Regardless of your background, if you are interested in the world of modern electronics, this course is for you!

#### **Introduction to Electric Circuits, Sensors, and Power**

You need more than a digital system and basic programming to make your electronics work -- you need to understand electricity, sensors, and what it takes to bring everything to life. In this course, the basics of electricity and electrical circuits will be covered. You will learn about circuit fundamentals, amplifiers, and filters, which allow us to recover signals from devices such as microphones. Our look into sensors will allow us to detect physical magnitudes (like light, sound, pressure, color, temperature, and speed) and turn them into electrical signals that our microcontroller can understand. Finally, we will explore the circuits that give power to our electronics and bring them to life. Along with an introduction to digital electronics, this course will allow you to build simple systems to develop and interface with electronics systems.

### Package B - Renewable Energy and Power Conversion (ELEC B JULY) [\\_\(#accordion-102b\)](#)

#### **Introduction to Renewable Energy**

Do you want to save the planet with green power? This course covers the fundamentals of renewable energy systems and includes topics on energy storage, power generation, distribution, transportation, and consumption. We will start with an introduction to carbon emissions, climate change, and environmental pollution to emphasize the importance of sustainability. Students will learn about solar, wind and ocean power generation. Grid connection and microgrids will be explained, as well as battery storage and fuel cell systems. Modern loads such as LED lights and electric vehicles will be discussed around the concept of demand side management. Students will gain skills on these emerging and key areas of green power and will have the opportunity to consider several case studies/examples. The course includes some tutorials and demonstrations using simulation software and physical equipment. What could be more important? The global energy markets will be dominated by renewables in the future - the planet will depend on engineers with a strong background in green power.

#### **Electricity and Conversion for Renewable Power**

How do we make renewable power generation happen? Renewable energy sources such as wind, solar, and ocean are intermittent and fluctuating. Changes in sun irradiance during the day, in wind speed variation, and changing ocean tidal velocity produce fluctuations in power generation. This course covers the fundamental of electricity and power conversion to transform variable/fluctuating energy into high quality power required to supply loads. The principles of power conversion for AC and DC system will be covered. Application examples will include topics such as power converters for battery chargers, solar inverters, wind/ocean power conversion, and traction for electric vehicles. The course will provide a strong theoretical background and enable students to understand renewable power conversion at the system level. A practical/applied component will be included, providing the student with real-world problem solving scenarios, laboratory experiences and visits to UBC state of the art power facilities.

### Package C - Communication and Digital Systems (ELEC C JULY) [\\_\(#accordion-102c\)](#)

### **Communication Systems: Technology Embedded in Daily Life**

Tweets, blogs, emails, videos, texts ... we rely on a myriad of communication systems, but how do these systems really work? This course will explore the key historic technological breakthroughs that have led to modern communication systems. This will be followed by an introduction to how information is represented and why the digital revolution is the underpinning of modern communication. The remainder of the course will analyze current communication systems, technologies and standards selected to give an overview of what is on the market. Examples include the LTE wireless standard which is common in most cell phone networks, Wi-Fi for local wireless communication, and modem technology which enables information to be transmitted and received over fiber optic cables, wires or air. Students will build their knowledge through case studies of current communication technologies and systems with an emphasis on understanding and relating performance specifications to the user experience.

### **Introduction to Digital Systems Design with FPGAs**

Digital systems lie at the heart of almost any electronic system including wearable devices, cell phones, signal processing systems, computers, biomedical devices, etc. In all of these systems, the "intelligence" of the system is implemented in digital logic. This course introduces digital systems, and how to design them. More specifically, you will learn about combinational and sequential logic, synchronous and asynchronous circuits, embedded processors, and other related topics. The course will have a significant laboratory component, where a digital hardware design language (VHDL) will be introduced and employed to bring to life your digital designs on an FPGA (field programmable gate-array) board.

### Package D - Engineering the Sound of Music (ELEC D JULY) [\\_\(#accordion-102d\)](#)

#### **Music: An Introduction to Electrical and Computer Engineering**

Music has become an integral part of our daily life, but so few understand the engineering behind it. This course will give you an overview of Electrical and Computer Engineering (ECE), revolving around music. Several aspects of ECE will be covered, including the basics of acoustics and waves, the technology behind microphones, the electronic circuits behind amplifiers, analog to digital converters (ADCs) and digital to analog converters (DACs), sampling theory, signal processing using analog and digital filters, operation of speakers, encoding and compression techniques used in mp3, etc.

#### **Music Laboratory: Hands on Learning**

Have you ever wondered how a DJ machine works? What are all those knobs used on a mixer? How does a noise cancellation headphone work? In this hands-on course, students will learn about the technical details of different equipment used by recording artists and DJs, such as mixers, distortion units, bass pedals, synthesizers, and MIDI. Students will design and test a guitar amplifier as a class project.

### Package E - Principles of the Modern Internet (ELEC E JULY) [\\_\(#accordion-102e\)](#)

#### **Algorithms and the World Wide Web**

The Internet and the World Wide Web have enabled new methods for communicating and working with data. What is the underlying infrastructure for the Internet? What are the algorithms used to move bits of data around? How is your credit card number kept secure when you buy a book from Amazon or Baidu? How is your location determined using GPS when you use Google Maps? How do some dating websites match people? We will discuss some of the system building and algorithmics that power the World Wide Web.

#### **Building Modern Web Applications**

Do you want to develop your own web-based application? Have you dreamed of making quick and slick looking web applications that are also robust? We will discuss the central abstractions and principles that enable the development of robust web applications. These principles can be applied when building applications using technologies such as HTML, CSS, and JavaScript.

### Package F - Introduction to Biofabrication and Machine Learning (ELEC F JULY) [\\_\(#accordion-102f\)](#)

#### **Biofabrication and Microtechnology**

3D printing has drastically changed the way we engineer and manufacture products. Based on a layer-by-layer approach, this technique allows for the building of intricate designs, from automobile parts to artificial tissue. In fact, biomedical engineers have 3D printed "living inks" or bio-inks, comprised of cells and biologically compatible materials, to engineer the microenvironment of artificial tissue. This course gives an introduction to the building blocks of this additive manufacturing process, including the engineering design process, computer-aided design, cell biology and biomaterial selection. In addition, it provides an introduction to the field of biomedical microdevices, which uses new microscale technologies, materials, and engineering techniques and applies them to a wide range of applications such as diagnostics, lab-on-a-chip systems, drug

delivery, microneedles, neural stimulation and recording, bioseparations, DNA analysis and sequencing, and biosensors. Lab studios will provide hands-on opportunities for learning experimental measurement and analysis techniques, simple microfluidic device fabrication, with a mini design project.

#### **Machine Learning in Biomedical Engineering**

Today, machine learning is successfully used for image and speech recognition, financial trading, natural language processing, and smart cars. Deep learning-based algorithms permit researchers to extract features from large volumes of complex data, and these methods will have large impact in permitting the interpretation of biological and physiological data for improving our health. This engineering course will introduce nonparametric and parametric machine learning techniques, including dimensionality reduction, clustering, decision trees, Bayesian models, ensemble methods, and deep convolutional neural networks. Students will gain hands-on experience working with sequence data such as for nucleic acids and proteins, attribute data such as gene expression arrays, and image data such as medical scans. Emphasis will be placed on applying machine learning techniques within student-written programs that solve real-world problems.

### **Applied Science - Mechanical Engineering >**

#### Package A - Robotics and Challenges From Computational Intelligence (MECH A JULY) [. \(#accordion-103a\)](#)

##### **Introduction to Robotics**

Introduction to Robotics will provide an overview of common robotic devices and their classifications, and discuss industrial and home robotics applications. Major technical challenges in robotics will be considered, including dynamics related to trajectory and path planning. Through lectures, group activities, and hands-on lab work, students will explore both how robots sense their surroundings and gather information, and how they can interact with their environment. Although this course is technical in nature and will include a hands-on component, no experience in robotics is required. Knowledge of programming is encouraged in order to follow the material.

##### **Roboethics: Challenges From Computational Intelligence**

This seminar-style course will provide students with an awareness of the current state of thinking about the design of robots that are meant to co-exist with people (service, therapy, military, sentry, etc.). The course will provide insight into how sociology, psychology, law, literature and design can contribute knowledge to arrive at a safe and effective co-existence between humans and machines that have some autonomy from their computational intelligence, i.e., robots. The course will examine the taxonomy of collaborative robots, the underpinnings of bioethics applied to technology, and several controversial robot application areas.

#### Package B - Mech Fundamentals: Mechanics of Materials and Dynamics (MECH B JULY) [. \(#accordion-103b\)](#)

##### **Introduction to Mechanics of Materials**

Introduction to Mechanics of Materials reviews core issues necessary for engineering design, answering the question: when applying forces and moments to an object, how much will it deform and when will it break? Subjects covered include: statically determinate frames and trusses; both normal and shear stresses and strains; shear force and bending moment diagrams; the theory of beam bending; torsion of circular rods; the transformation of stress and strain in two and three dimensions; stress in thin-walled pressure vessels; yield and ultimate failure criteria; and stress measurement techniques using strain gage, as well as other fundamental topics.

##### **Introduction to Dynamics**

A fundamental subject core to Mechanical Engineering, this course will explore how forces act upon rigid bodies and the movements that are generated. Classes will cover the dynamics of systems of particles, and then extend to rigid bodies in planar motion. Kinematics of rigid bodies will include relative and absolute motion analyses. Looking at the kinetics of rigid bodies in two dimensions, students will learn how to use Newton's second law equations of motion as well as work-energy and impulse-momentum principals, while gaining a practical understanding of their engineering applications. Advanced topics such as gyroscopic motion and its practical applications will also be covered. Students will be introduced to how engineering software is used to model, analyze and simulate the dynamics of rigid bodies and simple mechanisms.

#### Package C - Mech Fundamentals: Fluid Mechanics and Thermodynamics (MECH C JULY) [. \(#accordion-103c\)](#)

##### **Introduction to Fluid Mechanics**

This course introduces the fundamental concepts of how fluid moves, and provides an introduction to the engineering applications of fluid mechanics, from nautical to aerospace. Topics covered will include fluid properties, statics, and the force, energy, and momentum principles used for control volumes. It will also

review dimensional analysis and similarity, as well as laminar and turbulent flow, and pipe flow. Students interested in how planes stay in the sky, how drag is reduced on a vehicle, or how to move water through a building will need the principles covered in this course.

#### **Introduction to Thermodynamics**

A key topic in engineering is understanding how to convert energy stored in the environment into usable mechanical work. Through lectures and hands-on activities, students will learn about energy conservation and entropy transport in closed and open systems. These concepts will be applied to analyze refrigeration and power cycles, including the Otto (internal combustion engine) and Brayton (jet engine) cycles. Students will explore course principles through fun and practical demonstrations, including making their own ice cream!

## **Architecture and Landscape Architecture** >

### Package A - Thinking by Design (ARCH A JULY) [\\_\(#accordion-104a\)](#)

#### **Design Thinking Through Making**

The built environment is full of design problems. From products to cities, these problems do not have correct answers, but rather a range of possible solutions. To tackle these design problems, we need to explore different ways of thinking. In this hands-on course, students will learn to approach open-ended problems through the lens of a designer and explore the built environment through hands-on design projects. Students will tackle each project in stages, from initial concept to final result, with interim reviews along the way. They will learn to communicate their ideas both verbally and to critically analyze the work of classmates. Drawing from examples in architecture, landscape architecture, urban design and product design, students will cultivate abstract thinking skills and increase their visual literacy.

#### **Design Thinking Through Drawing**

Drawing is an essential part of design thinking and communication. From sketches, to plans, to detailed diagrams, visual representation is a fundamental skill. While digital methods are increasingly common, the culture of putting pencil to paper is still at the heart of these techniques. This hands-on course introduces you to the drawing techniques used in architecture, landscape architecture, and urban design. Through lectures, field trips and in-studio sessions, students will learn methods of visually communicating concepts and intent. With a focus on analog, the skills developed in this course will offer a strong base for further studies in design and design media.

### Package B - Urban Landscape Architecture (ARCH B JULY) [\\_\(#accordion-104b\)](#)

#### **Green System Planning**

Vancouver is a beautiful and sustainable city in a dramatic natural setting. What role do the natural areas in and around the city play in sustaining a metropolitan area such as Vancouver? This course will introduce how urban natural areas clean air and water, sustain wildlife and provide psychological and other health benefits to people. Students will learn about the most important environmental services and human benefits provided by the large parks and natural areas in the Vancouver region; and students will hike or bike on guided field trips to some of the region's most important and instructive landscapes, open spaces and parks.

#### **Design in the Public Realm**

Vancouver is known as a liveable and sustainable international city. An important aspect of the city's liveability is the design of its public realm — publicly owned parks, greenways, waterfronts, streets and squares. A well-designed public realm provides places for people to gather, socialize and recreate; encourages active transportation; maintains spaces for the urban forest and vegetation to thrive; and contributes other environmental services to the city. In this field-based course, students will learn how a well-planned and -designed public realm supports liveable neighbourhoods and provides important social and environmental services to the city. Students will learn how to document and assess public spaces in the city and, through daily field trips and guest lectures, will study the city's best examples of public realm design.

### Package C - Urban Design (ARCH C JULY) [\\_\(#accordion-104c\)](#)

#### **Perspectives on City Making**

Taught by the former Mayor of Vancouver Sam Sullivan, this class uses the development of the City of Vancouver to illustrate how many social, political, economic, creative and natural forces combine and interact to make a city. Students learn and experience these forces through the eyes of those who were a part of it. There will be tours and guest lectures from those who played a role in specific development projects. Students will gain an insight into both the practical and theoretical considerations that have led to the city as we know it.

#### **Sustainability by Design**

Using the City of Vancouver as a laboratory, this class introduces the basic principles of sustainable urban design through daily tours of internationally significant local examples. Relevance of these examples to global development is isolated and discussed. A typical day includes a lecture focusing on one principle of sustainable city design, followed by a tour of a place in the region where this principle is obvious. Students will see and experience examples of significant contemporary urban design practice in suburban, urban and downtown contexts.

## Arts >

### Package A - Global Migration, Local Communities: Asian Canadian Histories (ARTS A JULY) (#accordion-105a)

#### **Labour, Community, and Institution-Building: South Asian Histories in Vancouver**

This course allows students to experience the long history of South Asian communities in greater Vancouver, exploring both experiences of marginalization and community resilience and productivity. Sociological, historical, gender studies, and cultural perspectives will be explored, as well as extensive site-visits and community-based learning opportunities through guest speakers from local communities and institutions. Students will engage in independent and group projects that allow for the development of research, public-speaking, and project management skills.

#### **Chinese in Canada: Histories and Contemporary Issues**

Chinese have been coming to Canada since at least the 1850s; today, they are one of the largest minority communities in the country, with a particularly large concentration in the Greater Vancouver area. This course introduces students to histories of Chinese immigration as well as contemporary issues such as racism, identity, gender, and sexuality. Students will gain first-hand experience with local communities through guest speakers and visits to important sites such as Vancouver's historic Chinatown and Richmond, home of one of the largest recent immigrant communities. In order to prepare students for further academic studies in English, this course will focus on developing skills in research, critical thinking, public presentation, digital media, and writing.

### Package B - Global Journalism, Culture, and Communications: Practice and Principles (ARTS B JULY) (#accordion-105b)

#### **Culture and Communication**

Anthropology is the study of human societies and cultures and their development. A very important area of interest is human language. This course will examine the relationship between language and culture by covering key debates in the field including animal vs. human communication, cross-cultural differences, language policies and language change. Students will explore how language is involved in cultural constructions of race, gender, class and ethnicity. They will also analyze how language is understood in relation to power, political economy and language ideologies. Students will gain experience in meeting writing standards for UBC Arts/Anthropology courses and will receive individual feedback on writing assignments.

#### **Global Journalism**

This course will examine the development of media technologies, their applications, and their cultural, political and social impacts. Students will also gain hands-on experience in learning how to think and operate like a professional journalist in a simulated multimedia environment. It is designed to introduce students to the grammar and syntax of media across platforms, based on a core journalistic skill set of interviewing, reporting, news writing, and research methods in tandem with the most current technical tools.

### Package C - The English Language in a Globalized World (ARTS C JULY) (#accordion-105c)

#### **The History and Future of the English Language**

In order to contextualize present-day changes in English, the course will begin with a brief history of the English language. It will then examine issues such as the national dialects of English (e.g. Canadian English, British English, Singapore English), regional and social dialects, the effects of gender on language forms and use, language in computer-mediated discourse (in texts, emails, social media), and ongoing changes in contemporary English. The course will provide students with a better understanding of how English is used in different contexts, and the directions in which the language is heading in the 21st century.

#### **How Human Language Works**

An introduction to how human languages work, examining the structures that underlie all languages, with special focus on the deep structure of English. The course asks what universal properties are shared by all languages, and how languages as divergent as English and Chinese can be different (or similar!) in terms of their sound systems, word-building, grammar, meaning, written form, and acquisition by children and adult

learners. By the end of the course, students from varied language backgrounds should understand how knowledge of the universal properties of languages can deepen their understanding of English, of their own language(s), and of the amazing capacity of the human mind.

#### Package D - International Finance, Trade and Politics (ARTS D JULY) .(#accordion-105d)

##### **International Trade and Financial Markets**

The modern global economy is intricately tied together through networks of trade and financial interconnections. This course will give students an understanding of the structure and function of international trade and international financial markets. The course will give a basic introduction to the forces driving international trade in goods and financial assets among nations of the world. The major theories of international trade and financial markets will be reviewed. Topics covered will include the determinants of a country's trading pattern, recent trends in international trade such as offshoring and global supply chains, the role of financial markets in international development, the future of the Renminbi as an international currency, the understanding of international financial crises, and sovereign debt crises.

##### **Dynamics of Democracy and Global Uprisings**

This course deals with some of the key concepts of political science, matching them with developments around the globe. We begin by considering some of the concepts and controversies in defining democratic and non-democratic systems. How do we tell democratic systems from nondemocratic ones? Are all democracies the same, or at least similar? Is citizen satisfaction a distinctive quality of those regimes? We then link these discussions to the rising waves of global discontent around the globe. The seemingly-universal quality of these uprisings give a strong indication that the struggles we are witnessing are no longer over democracy versus other systems: instead, what seems to be at issue are the meanings and practices largely associated with democratic regimes, the expectations of people, and what regimes provide. Finally, we focus on specific uprisings, chosen by the students, in an attempt to contextualize our discussions and make sense of recent global developments in an informed, thoughtful manner.

#### Package E - Environmental Economics and Geographies of the Global Economy (ARTS E JULY) (#accordion-105e)

##### **Geographies of the Global Economy**

This course will explore the fast-changing geographies of the global economy from the uniquely grounded perspective of economic geography. The course will examine a range of contemporary issues and debates in the field, including: the development of transnational production and logistics networks; changing patterns of migration and labour mobility; the growth and influence of world cities and financial centres; new models of economic growth and varieties of capitalism; and contrasting perspectives on economic and cultural globalization. Students will acquire an up-to-date understanding of the changing global economy and its principal challenges and opportunities, together with an understanding of their own place in the world.

##### **Environmental Economics**

This course provides an introduction to economic aspects of environmental problems and sustainability. It will begin with an overview of selected environmental problems, such as the effects of air and water pollution on human health, threats to biodiversity from habitat destruction, and climate change. Trends and indicators of environmental sustainability, both within and across countries, will be reviewed. The course will focus on questions such as why environmental problems occur, whether or not globalization is increasing the severity of such problems, what types of policies have been successful in improving environmental quality, and whether or not current consumption levels are sustainable. Policies will be analyzed from the perspective of efficiency, effectiveness, political feasibility and fairness, and examples will be drawn from different countries.

#### Package F - The World of Manga and Anime: From Writing to Theory (ARTS F JULY) .(#accordion-105f)

##### **Manga and Anime in Global Perspective**

This course examines the Japanese popular culture media manga and anime through questions such as: What makes manga and anime globally popular? Can we consider manga and anime forms of international "soft power"? What tools are used in the analysis of manga and anime? What is the relationship between manga and similar media such as Chinese manhua, Korean manhwa, Francophone bandes dessinées and North American comic books? What do fans do with manga and anime, in Japan and elsewhere around the world? By the end of the course, students will have gained practice in writing short expository papers in English; will have mastered analytical tools used in the study of popular culture from Film Studies, Manga Studies, Anthropology, and Literary Studies perspectives; and will have knowledge of industry and governmental institutions and regulations that affect the creation, distribution, and consumption of Japanese popular culture products around the world.

##### **Writing Craft of Manga and Anime**

This class will lead students through the practical stages of storytelling and manga-creation through hands-on projects and questions such as: What are the tools, theory and techniques of graphic storytelling? What makes a story 'manga'? What are the tropes and conventions of manga storytelling and what do they share with other forms of visual storytelling? What is storyboarding for anime and how does it differ from manga? Students will be guided through a step-by-step exploration of the process of making manga from initial idea to finished product. This includes: scripting, thumbnailing, penciling, inking, colouring, lettering and finally binding of a self-made doujinshi manga. Students will refine their storytelling through peer feedback and collaboration. By the end of the course, students will have crafted their own completed, original, self-published manga, demonstrating a working knowledge of the form.

Package G - Computational Linguistics: From Search Engines to Social Media (ARTS G JULY) (#accordion-105g)

**Linguistics for Natural Language Processing**

An introduction to the general linguistic principles and concepts that are relevant for computational linguistics, including: (i) an introduction to phonetics and phonology, (ii) an understanding of syntactic and morphological structure, (iii) descriptive approaches to grammar, (iv) language typology and linguistic universals, including differences and commonalities between different languages, cultures and modes of communication. In each case, special reference will be made to computational applications, and by the end of the course students should understand how knowledge of the universal properties of languages both contributes to and benefits from computational research and applications.

**Computation for Natural Language Processing**

This course will take students with little or no background in computing and teach them programming basics and the practical uses of computational linguistics and machine learning. Students will learn how to use a command line interface and create simple programs using Python and NLTK. The course will then take them step-by-step through how programs perform such tasks as tagging speech and analyzing sentence structure or meaning. They will see how these steps can be applied in such useful and ubiquitous applications as error correction, spam filters and author identification among others. Finally, they will see concrete examples of how computation is contributing back to traditional areas of linguistic enquiry.

Package H - From Stage to Screen: How Vancouver 'plays' to a Global Audience (ARTS H JULY) (#accordion-105h)

**From Drama to Theatre: How Does a Play Mean?**

This course will explore the languages of theatre within Vancouver's rich and lively performance culture. How do individual artists--directors, actors, designers--transform a playwright's ideas into unique and original art? In what ways, for example, will a Shakespeare play produced in Vancouver become a Canadian play? These questions and more will be explored in relation to two plays a week in production in Vancouver during the term. We will examine and discuss the play scripts, attend the plays, and meet "backstage" with some of the artists themselves. Plays chosen will span a variety of genres, including Shakespeare (in production at Bard on the Beach Shakespeare Festival), musicals (in production at Theatre Under the Stars and the Arts Club Theatre Company), plus additional dramas and comedies in production.

**Documentary and the City**

For the first time in human history a majority of the world live in cities. While there are multiple threats posed by the growth of cities, such as poverty, migration, and social divisions, there are also surprising and innovative practices that emerge. The city of Vancouver is brimming with stories that can tell us many things about the world we live in. Focusing on documentary films and filmmaking, this course introduces students to these often hidden stories of the city through key writings, films, and direct engagement with life in Vancouver. Students will use creative methods to connect critical analysis with their everyday experiences, while authoring basic documentary projects in neighbourhoods throughout the city.

Package I - Social Diversity: Theories, Policies and Practice (ARTS I JULY) (#accordion-105i)

**Inequality and Diversity in Modern Societies**

This course explores the concepts and theories surrounding social diversity across a range of modern societies. The aim is to highlight how societies are stratified along different social categories, and engage students to think critically about the organizational structure of multicultural societies. The course will begin with an overview of the demographic and socioeconomic position of various groups. The course will then analyze the social inequalities that exist among these groups and the social mechanisms and policies that generate these differences. Drawing from real life examples and research findings, the course will teach students how to think sociologically about specific issues (e.g. labour market participation, health outcomes, civic participation) that are relevant across the globe but also pay attention to those pertinent to multicultural societies such as Canada. Lastly, the course will use assignments to enable students to analyze these issues and think about practical solutions to address them.

### Practice with Marginalized Diverse Populations

Based on a social justice framework, this course will explore the application of the concept of diversity, i.e., ability, age, ethnicity, race, gender, citizenship status, and sexual orientation in policy and practice with the diverse population. This course will then examine how different forms of diversity individually and intersectionally cause predicaments to and marginalization of individuals, groups and communities. Using Canadian policies as an example, students will learn and critique the strengths and limitations of the human rights and multicultural discourse prevalently embraced by many western countries. Through agency visits and small group discussions, students will examine different ways and approaches of how health and social service practitioners apply the concept of social diversity in serving and advocating for individuals, groups and communities to overcome these predicaments and marginalization.

## Business >

### Package A - International Business Management and International Marketing (BUS A JULY) (#accordion-106a)

#### **International Business Management**

This course is taught from the perspective of a senior manager at multinational enterprise. It analyzes the decisions made by firms in an international context. To do so it combines material from strategy, international finance, marketing, human resource management, positive trade theory, institutional trade policy, and other areas. It will emphasize the use of analytical tools and the development of oral and written communication skills. By design, the course is integrative, implying that there is some overlap with material taught in international marketing and finance courses.

#### **International Marketing**

This course examines the process of entering international markets and in conducting marketing operations on an international scale. Through lectures and practical assignments students will explore a broad range of global marketing issues and concepts.

Specific objectives include understanding the role of marketing in business, analyzing the external issues affecting international marketing activities including the economic, social/cultural, and political/legal environment, identifying and assessing global marketing opportunities in the international marketplace, gaining experience in developing international marketing strategies, and planning to implement and adapt these activities in specific markets.

### Package B - Strategic Management and New Enterprise Development (BUS B JULY) (#accordion-106b)

#### **Strategic Management**

Concepts and processes for the strategic management of private sector, single and multi-business unit enterprises are analyzed using the case method. Methodologies which draw on economic and organizational theory are integrated to form the foundations for strategic analyses. This course builds students' ability to analyze and develop business strategies by introducing frameworks and tools to understand the nature of competition in general and to analyze the specific competitive position and strategic options of a given firm. You will learn frameworks for analyzing industry structure, internal capabilities, and competitive interaction, as well as how to use those frameworks to critique a specific firm's competitive position and develop and evaluate strategic alternatives.

#### **New Enterprise Development**

This is an introductory course to the field of entrepreneurship. It is also useful to anyone who expects to be interacting with entrepreneurs in their business careers, be it as private investors, venture capitalists, consultants or customers. The course provides an experience-based exposure to the process of starting entrepreneurial ventures as well as examining the challenges facing any would-be entrepreneur in the real world. This includes developing business models and strategies for innovative products or services and strategies for acquiring resources, particularly financing.

### Package C - Introduction to Marketing and Management and Organizational Behaviour (BUS C JULY) (#accordion-106c)

#### **Introduction to Marketing**

This course is designed to provide a broad introduction to the field of marketing and basic considerations affecting the domestic and international marketing of goods and services. Marketing is far more than just selling or advertising within a business setting; it is a major part of everyday life. This course will illustrate the importance of marketing and will help you develop fundamental marketing knowledge and skills applicable to all specializations within business.

#### **Management and Organizational Behaviour**

The primary objective of this course is to teach you about the effects of organizational structures and interpersonal processes on the behaviour of individuals in organizations and the wider implications for the effectiveness and success of organizations. This course will expose you to frameworks, approaches and behaviours that can help in effectively participating, leading and managing in organizations. Research has shown that effective people management is an important contributor to organizational success. The emphasis will be on creating effective leaders and team members through a better understanding of motivation, working in teams, power and influence, leadership and navigating organizational culture and change. All this will help participants contribute to the success of themselves and their organizations.

#### Package D - Operations and Supply Chain Strategy and Business Analytics (BUS D JULY) [\(#accordion-106d\)](#)

##### **Operations and Supply Chain Strategy**

Operations is one of the fundamental functions of any organization. Operations and Supply Chain managers are primarily concerned with the efficient execution of an organization's strategy. In doing so, they also help shape a firm's future strategy. Operations is concerned with designing and managing processes that transform inputs to outputs in an organization. This includes important activities such as the production and delivery of goods and services. Operations is also responsible for the systematic planning, designing, operating, controlling and improving the various processes involved from the time a customer places an order to the time the product or service is delivered. The challenge for supply chain managers is to produce goods and deliver services in accordance with the business strategy of their company in most efficient manner. Typically, this involves balancing the needs for lower costs, higher quality, shorter production times and greater operational flexibility, while at the same time getting the customer orders (products or services) out on time. In this course you will learn the fundamental ideas of good operational principles and Supply chain management. You will understand how an organization's strategy and operations are related to each other. You will also understand the impact of operational decisions on the various other business functions such as marketing, finance and human resources. This will help enhance your managerial insights and intuition and improve your business decisions. The course will feature practices from various companies such as Zara, Alipay, Tencent, Walmart, GE, Toyota and many others.

##### **Business Analytics**

Business professionals must have familiarity with and skills in each of descriptive, predictive and prescriptive analytics. Descriptive analytics includes data analysis and data visualization: understanding, manipulating, evaluating and presenting the many complex data and information streams that drive today's businesses and organizations. Predictive analytics includes forecasting, various statistical techniques, data mining, and machine learning. Prescriptive analytics involves the employment of a number of analytical models to aid decision-making. Topics covered in this course include: descriptive statistics, data visualization, descriptive data mining (cluster analysis), linear regression, predictive data mining (classification trees), spreadsheet models, linear optimization and Monte Carlo simulation. This course aims to provide essentials on these topics, equipping students with the literacy of business analytics. Each student must bring his/her own laptop computer with Excel.

## **Community and Regional Planning** >

#### Package A - Smart Cities: Big Data and New Technologies (PLAN A JULY) [\(#accordion-1006a\)](#)

##### **Urban Big Data Analysis**

With the advent of open data movement, knowledge and skills for collecting and analyzing big data become increasingly important for urban planners. This course will teach you how to harness the power of big data by mastering the way they are collected, organized, and analyzed to support better decision making in urban planning context. You will learn the basic tools needed to manipulate large datasets derived from various open-data platforms, from data collection to storage and approaches to analysis. You will capture and build data structures, perform SQL and basic queries in order to extract key metrics and insights. In addition, you will learn how to use open-source programming tools, such as R and Python, to analyze and visualize the data. These statistical tools and methods will be complemented by machine learning and pattern detection techniques, in addition to new technologies for big data.

##### **Spatial Analysis Using Geographic Information Systems**

GIS technology sits at the intersection of the world around us and our incredible computing capabilities that allows us to investigate and visualize that world in new and exciting ways. This course will introduce you to key concepts, methods, and tools used to collect, analyze, map, and visualize geospatial data. You will explore what makes spatial data special, some of the ways it is collected, and how it can be used to answer questions about the world around us. You will use geospatial data to help with decision making and to inform policy-making. You will use computer-based geographical methods of data input and analysis to model the world around them, to explore real-world scenarios, and present their findings to others. Practical applications will be investigated in both the natural and human realms through lectures, discussions, group exercises, and a hands-on computer lab component.

Package B - Negotiation and Behaviour Change in the 21st Century (PLAN B JULY) (#accordion-1006b)

**The Art of Negotiation**

Managing conflict is an essential part of any professional career. Professionals must work to find consensus when stakeholder interests' diverge or conflict. Failure to reach agreements can be costly for all involved. In contrast, lasting agreements are those in which value is created, the process is fair, and the relationships are maintained or enhanced. This course will prepare students to be more effective negotiators. Students will learn about negotiations and managing conflict through experiential exercises. Through the use of role-plays or negotiation games, students will learn about themselves, how they respond to conflict, and strategies to work through these conflicts. The exercises will be key to illustrate the relevance of negotiation theory, strategies for conflict management, and best practices.

**Citizen Engagement for Behaviour Change: The Good, the Bad and the Ugly**

Cities increasingly adopt information and communication technologies to offer optimal services, promote sustainability, climate resilience, innovation, and ultimately create smart cities. Smart cities rely on information/real-time feedback to help citizens make better decisions. However, individual and social factors influence how we use information and make decisions. In this course we cover concepts in decision sciences and use experiments to understand decision-making and citizen engagement that depend on citizens' mutual learning, trust and reciprocity (the good), can be affected by behavioural biases (the bad), and manipulated by interested groups (the ugly). Through active exercises, we address opportunities and challenges to improve citizen engagement while preventing the perils of malfunctioning and manipulation of public participation, especially in large, modern and fast-growing cities.

Package C - Multiculturalism and the City (PLAN C JULY) (#accordion-1006c)

**Cultural Industries in Vancouver: The Once-Secret Life of Family Food**

This course is aimed at stimulating student interest in a range of careers: business/marketing, economic development, community planning, hospitality, photography and media studies, anthropology, history and heritage conservation, computer programming, and social advocacy. By going 'behind the scenes' at restaurants and family food businesses in Vancouver, students will discover how family recipes get handed down over the generations and become a selling point for the city's bespoke food industry. Students will research the city's multicultural history of foods as social enterprise, family histories, photographically document food culture, and identify creative, successful, business practices. The instructor has several years' experience with teaching material cultural analysis to MBA students in business school. Students will collaboratively design the template for a free, web-based HTML guide to Vancouver's family food businesses, in consultation with Tourism Vancouver.

**Past, Present and Future: Building from Vancouver's Multicultural Planning History**

Vancouver's residents are comprised of different communities made up of different religions, ethnicities and cultural backgrounds. More than 40% of Vancouver residents were born in another country. These communities have shaped and transformed Vancouver's social fabric, the local economy, and the built form of the city. In this course, students will connect issues such as urban development, gentrification, re-zoning, community-action projects, global immigration, and sustainability agendas with the ongoing evolution of intercultural understanding and multicultural cosmopolitanism in Vancouver. Through site visits to key locations throughout the city such as Chinatown, Stanley Park, Olympic Village and the False Creek Flats, students will unpack the diverse and complex history of the communities who contribute to city building processes in Vancouver. This course will include both classroom theory and lectures, as well as site visits with student reflection and discussion in the field.

**Dentistry >**

Package A - Implications of Dental Caries and Oral Cancer (DEN A JULY) (#accordion-107)

**Dental Caries and Restoration**

Dental caries is a common human infectious disease affecting more than 90% of all humans. The disease requires a combination of bacteria, a sugar source and a susceptible tooth mineralized surface. Bacteria metabolize sugar producing acid as a by-product that dissolves the tooth surface mineral. Destruction of the tooth leads to the pathology, dental decay. Dental decay is a progressive process and if it is allowed to continue it can progress into the dental pulp and the supporting bone. If a bacterial abscess forms in the bone supporting the tooth, it is often necessary to remove the tooth. Dental caries is the leading cause of tooth loss in the world. Tooth loss affects the ability to eat, alters nutrition and has a dramatic impact on the quality of life. This course will take a comprehensive look at the implications dental caries to understand how this disease impacts human populations.

**Oral Cancer**

Cancer of the oral tissues is the 6th most common type in the world. In some developing countries oral cancer is much more common due to oral habits and exposure to chemicals that can cause cancer. The five year survival rates for oral cancer remain low with nearly half of all the affected individuals dying from the disease. Early diagnosis of oral cancer is the most effective approach to decrease the mortality and morbidity. Pre-malignant lesions exist that have a much higher chance of becoming oral cancer and the recognition and management of these lesions can prevent cancer development. Oral cancer occurs in an anatomic location that is amenable to early diagnosis. Many techniques have been developed to aid in the recognition and diagnosis of both pre-malignant and malignant oral lesions. In this course the development of oral cancer, the clinical signs of the condition, the clinical and laboratory procedures for diagnosis and the long term consequences of an oral cancer diagnosis will be covered.

#### Package B - Foundations of Oral Health Professions (DEN B JULY)

##### **Foundations of Oral Health Professions**

The course will provide an in depth review of the scope of Oral Health Professions. Participants will learn the foundations of dentistry and dental hygiene. The course will cover oral health concepts as dental anatomy, dental caries, oral hygiene, preventive dentistry, general dentistry, geriatrics, public health. The course will cover specialty dental education such as prosthodontics, oral medicine/oral pathology, pediatric dentistry, periodontics, orthodontics, endodontics, oral surgery. Participants will learn about existing research at UBC Faculty of Dentistry and how it related to oral and systemic health.

##### **Foundations of Oral Health Professions: Practical Implementation**

The course will provide a hands-on approach to dental and oral health concepts that will be covered in Course A. Participants will be able to develop an understanding and individual psychomotor skills through a variety of preclinical experiences, working at the UBC dental clinic and laboratories. Participants will have an opportunity to shadow specialists in a variety of dental disciplines, and observe cutting edge research. This course will provide participants with tools to enhance their application to dental or dental hygiene programs (e.g. DAT prep, meeting with admissions specialists, resume writing, study strategies and stress management, mock interview).

#### Package C - Correlative Imaging (DEN C JULY)

##### **Principles of Correlative Imaging**

In this course, the concept of correlative imaging is introduced. To fully understand scientific samples, using different imaging modalities can provide a more complete picture. These pictures can be used to provide quantitative analysis of the structure and composition of the samples. This course will introduce the theory behind different imaging techniques ranging from x-ray micro-computed tomography to optical and electron microscopy. Topics covered will include image formation, mechanisms of contrast, and image resolution. Additional processing steps to obtain quantitative information from the images will also be introduced.

##### **Practical Correlative Imaging**

Correlative imaging is a challenging task, that requires understanding of the complete imaging chain and analysis. In this course, the students will participate in the entire workflow, from preparing the sample, imaging with different modalities, and image analysis to provide quantitative data about the sample structure and composition. Sessions will include demo sessions in the UBC Centre for High-Throughput Phenogenomics ([www.chtp.ubc.ca](http://www.chtp.ubc.ca)). Proper lab attire is mandatory for all sessions of this course (clothing that covers arms/legs and closed-toe, closed-heel, solid-soled shoes).

## **Education >**

#### Package A - Teaching and Learning English (EDU A JULY) (#accordion-108a)

##### **Applied Linguistics for Teachers**

Successful language teachers need to understand more than just the structure and nature of the language(s) they teach: they also need to develop an understanding of the social, cultural, and ideological implications of language and language education. Language classrooms are diverse, multilingual, multicultural and multimodal places, presenting students and teachers with unique challenges. This course serves as a general introduction to theory and research concerning these issues as they relate to learning and teaching, from the perspective of applied linguistics. Topics to be discussed include: theories of first- and second-language learning; the relationship of theoretical issues in applied linguistics to educational practice; language variation; language attitudes and ideologies; world Englishes; language and globalization; language policy; language and gender; language and race, and more.

##### **Introduction to Teaching and Learning English**

This course provides a general theoretical overview of and some practical preparation for English language teaching (ELT). Its scope is diverse as it considers approaches to language teaching, a range of teaching techniques and strategies, learner needs, instructional contexts, assessment, and sociocultural concerns, as they pertain to teaching English in a variety of contexts. The course examines ways to teach listening, speaking, reading, writing, grammar, and vocabulary but always with a view to integrating these skills. Students will have the opportunity to contribute to and learn from active engagement in discussions on contemporary ELT issues and topics.

#### Package B - Early Childhood Education and Development (EDU B JULY) (#accordion-108b)

##### **Designing High Quality Programs in Early Childhood Settings**

This course addresses the notion that children are natural learners. Students will learn about, discuss, and clarify important concepts and theories relative to early childhood education, including child development theory and the holistic nature of learning in the early years. The course highlights the idea that young children's innate capacity to learn and teachers' responses to children's inquiries provide the foundation for the development of high-quality early learning experiences for young children and impacts the type of programming that is created. Students will learn about designing appropriate daily routines and implementing teaching strategies for integrating different areas of learning, such as literacy, math, science, and art through inquiry and project-based learning. The course will also include observations in local Early Childhood settings.

##### **Creating Environments to Support Learning in Early Childhood Settings**

This course introduces students to the significant role that designing stimulating and nurturing early childhood classroom environments plays in children's learning and in supporting all aspects of their development and growth. Students will learn about creating dynamic indoor and outdoor learning spaces for young children and the importance of providing children with original and natural educational materials and resources. The course will include visits to local state-of-the-art Early Childhood environments for young children.

#### Package C - Classroom Management and Behavioural Assessment (EDU C JULY) (#accordion-108c)

##### **Classroom Management**

The course is designed to empower educators to develop a positive classroom climate and an effective learning environment, in which teachers and their students engage in meaningful and successful learning experiences together. To achieve this goal, students will be introduced to current, evidence-based practices in school-wide, classroom and individual behaviour support. Classes will include lectures, discussions and small group activities that provide opportunities to develop skills in the application of these practices. Specific objectives of the course include developing student knowledge and skill in: (a) proactive approach to classroom management; (b) school-wide positive behaviour support; (c) design of a positive classroom environment; (d) development of positive, nurturing relationships with students; (e) use of positive reinforcement to strengthen prosocial behaviour; and (f) effective ways to respond to problem behaviour.

##### **Assessment and Positive Behavioural Support in School and Community Settings**

The course introduces students to the philosophy and methods of behavioural assessment and positive behaviour support with persons who engage in challenging behaviour in school and community contexts. Specific objectives of the course include developing student knowledge and/or skill in: (a) basic principles of behaviour change; (b) features and values of positive behaviour support; (c) ecological assessment of environments and functional assessment of persons with challenging behaviour; (d) completion of summary hypothesis statements and competing behaviour pathway diagrams; (e) design of multi-component behaviour support plans that are logically linked to assessment results; and (f) design of plans that are both technically sound and contextually appropriate.

#### Package D - Food and Wellbeing - Learning the Connection (EDU D JULY) (#accordion-108d)

##### **Eating Food: An Everyday Experience**

Deciding what to eat is an everyday event that is experienced in every culture and location. Learning about food requires knowing more than just how to be a consumer. This is an introductory course that provides a broad overview of different foods, food safety and preparation techniques and explores how food decisions can support wellbeing. Students will have an opportunity to reflect on their own food choices and develop critical thinking and collaborative work skills through class discussions and assignments. Topics to be discussed include: food supply in the Western context and how this compares to students' experiences; what influences our food choices; and everyday food practices and how these are linked to globalization. By the end of the course students will have participated in a range of activities including visits to farms and markets; experts who will talk about how they prepare and provide food; and teaching about foods from their culture.

##### **Thoughtful Eating in a Globalized World**

The aims of this course are to help students develop understandings about sustainable food production and eating safe food. Topics of this course will introduce differences in food production as a cyclic process rather than one that is linear; food safety and eating for wellbeing. By the end of the course students will: be familiar

with sustainability concepts; develop holistic strategies for eating that enhances wellbeing; and be able to apply the learning to their everyday experiences. They will have experienced a range of locations where food is purchased and consumed; maintained a journal that will allow students to think about how people make their food decisions, and considered the implications of different ways of eating that have an impact at local and global levels.

#### Package E - Culture, Creativity, and Learning Technologies (EDU E JULY) [\\_\(#accordion-108e\)](#)

##### **Digital Media in Arts Education**

This course is an introduction to teaching and learning with digital technologies through the creative arts. Beginning with an exploration of curriculum and pedagogy from an arts-based technological perspective, the course examines the multiple opportunities and challenges arising from using digital technologies to approach the creative arts in educational contexts. Using an up-to-date laboratory of computers, iPads and synthesizers, students will work together in exploring digital music, video, photography, and other creative arts apps and software used in educational settings. Participants will take an active role in their learning processes – including setting goals, researching creative digital tools, engaging in peer-evaluation, participating in discussions, doing presentations, writing reflections and seeking out relevant research readings and resources. This course will help students build a foundation for critical thinking about education, digital media and the creative arts.

##### **Learning Technologies and Creativity in the Digital Age**

This course offers students a space to create and a community to explore ideas about integrating learning technologies in primary and secondary classrooms. Students will engage in this course as instructional designers, content creators, and tinkerers working together on personally or pedagogically meaningful projects. Learning involves defining problems and generating solutions, questioning assumptions, exercising ingenuity, prototyping and experimenting with diverse ideas, materials and perspectives. The educational philosophy underlying this course emphasizes project-based learning with digital media and technology. Students will have diverse opportunities to design innovative learning environments and create digital learning artifacts and resources. No background knowledge or experience is required for this package. Students will benefit from creative instructional strategies and technology-supported learning activities.

## **Forestry** >

#### Package A - Forest Management and the Effects of Carbon (FOR A JULY) [\\_\(#accordion-109a\)](#)

##### **An Introduction to the Ecology, Economics and Politics of Carbon**

Humans use carbon-based molecules in almost all aspects of daily life – food, shelter, clothing, and power generation are but a few examples. Unfortunately, deforestation, land degradation, and fossil fuel emissions are responsible for the build-up of carbon in the atmosphere. This is causing the atmosphere to heat up which in turn is changing the global climate. To understand why this is a problem and what we can do about it, students will be provided with an introduction to the ecology of carbon (where it is, and how it cycles through the living and non-living world). We will then discuss the challenges of limiting carbon emissions by considering the interaction between economics and politics. This interactive course will include lectures as well as fieldtrips to different sites around campus to demonstrate the concepts learnt in class.

##### **Sustainable Forest Management**

This course represents an attempt to integrate knowledge and processes relating to forest management across a wide array of disciplines, but it is centrally concerned with bringing the underlying ecological and management science together. It involves a mix of lectures, group discussions and field visits to increase the understanding of students about problems involved with managing forest ecosystems for a variety of societal goals and objectives. The course is heavily geared towards ecological, economic and policy context of British Columbia; however, international implications and issues of forest management are also covered. The objective of the course is to familiarize the students with a variety of forest ecosystem values and their management issues and to enable meaningful analysis of the current issues in forest sustainability.

#### Package B - Urban Forestry (FOR B JULY) [\\_\(#accordion-109b\)](#)

##### **An Introduction to Urban Forestry**

This course will provide a general introduction to the concept of Urban Forestry and why this is an important topic in today's rapidly urbanizing society. There is a growing need to adapt to multiple impacts of climate change; and increasing demand from the public for the recreational, psychological and health benefits that green-space networks provide. With increased urban populations, global warming, urban heat islands, flooding and pollution, cities may become unlivable or demand massive energy-use for cooling, unless we can establish large scale, healthy urban forest systems. This interactive course will be supplemented by a number of field trips around the Greater Vancouver area, visiting a number of local parks and hearing from experienced practitioners in the field.

## Urban Forestry and Well-being

Urban forestry is about planning and managing urban green-spaces and ecosystems for human welfare, ecological health, and protection of our cities' support systems. Urban forest networks, parks, wetlands, and other green infrastructures are vital in moderating heat waves and cooling demands, maintaining biodiversity and carbon sinks, controlling forest fires, storm-water flood mitigation, bio-energy production, etc. Urban Forests improve and protect our health, property values, local jobs and businesses, outdoor recreation opportunities, and community character. This course will give the students an introduction to the importance of understanding urban forestry in the face of today's rapid urbanization as forests and green systems compete for space among buildings, roads/transit, storage facilities, and energy infrastructure. Students will be able to experience the concepts learned in class through fieldtrips and class activities. Past participants have been taken on fieldtrips to various locations around the Greater Vancouver area including Surrey, North Vancouver and Stanley Park.

## Kinesiology >

### Package A - Sport and Exercise Performance (KIN A JULY) [\\_\(#accordion-110a\)](#)

#### **Sport and Exercise Performance**

This theory-based course offers a practical overview of core topics and applications in sport and exercise psychology. The course is intended to develop students' understanding of psychological factors that impact participation and performance in physical activity contexts. Students will have the opportunity to participate in group activities, apply knowledge to specific scenarios, and develop mental skills to demonstrate the application of psychological approaches. In particular, students are encouraged to reflect on how they can translate theoretical concepts and models into practice. Past guest lecturer for this class includes Matt Fisher, Head Strength and Conditioning Coach and part of the Integrated Support Team Lead for Canada Snowboard's National Freestyle Program for the 2010 Winter Olympics team.

#### **Clinical Exercise Physiology**

This theoretical and lab-based course will provide an overview of clinical exercise physiology. Diverse class activities include problem-based case studies, group projects, hands-on labs to examine cardio respiratory function, muscle function, and metabolism. The course will include visits to labs such as the world-renowned Physical Activity Research Centre (PARC) to facilitate an active learning environment. Upon completion of this course, students will develop an understanding of fundamental approaches to the assessment of physiological responses to exercise; altered responses in various clinical syndromes; and how exercise prescription and exercise monitoring is applied in clinical settings for health promotion. Students will also gain an appreciation of the influence of exercise and lifestyle on the prevention and treatment of chronic diseases.

### Package B - Coaching Science (KIN B JULY) [\\_\(#accordion-110b\)](#)

#### **Foundations of Coaching**

This introductory course to coaching provides the foundation to become a successful coach. It will enable students to define who they are as coaches and will enhance their training and development skills with supplemental knowledge in strength and conditioning, nutrition, motor learning development, and performance planning. Practical outdoor sessions are offered in conjunction with the lectures to demonstrate core concepts in coaching. Upon completion of the course, students will be able to recognize the power inherent in coaching by creating their coaching philosophy and apply process to achieve it. They will learn how to recognize common sport injuries and provide a safe training and competition environment, how to use games for learning skills and building physical condition, and how to apply basic prophylactic and supportive taping systems.

#### **Sport Psychology for Coaching**

This course provides a broad overview of major topics in Sport Psychology for Coaching. The student will develop an awareness of how sport and exercise psychology knowledge can be applied in coaching and understand the importance of the many mental aspects of coaching including group dynamics, motivation, leadership, coach-athlete relationships, and mental skill training. Complementary activities including outdoor games, tours at sport training centres, sport facilities, and research labs are designed to facilitate interactive learning.

### Package C - Clinical Kinesiology (KIN C JULY) [\\_\(#accordion-110c\)](#)

#### **Clinical Exercise Physiology**

This theoretical and lab-based course will provide an overview of clinical exercise physiology. Diverse class activities include problem-based case studies, group projects, and hands-on labs to examine cardio respiratory function, muscle function, and metabolism. The course will include visits to labs such as the world-renowned Physical Activity Research Centre (PARC) to facilitate an active learning environment. Upon completion of this course, students will develop an understanding of fundamental approaches to the assessment of physiological

responses to exercise; altered responses in various clinical syndromes; and how exercise prescription and exercise monitoring is applied in clinical settings for health promotion. Students will also gain an appreciation of the influence of exercise and lifestyle on the prevention and treatment of chronic diseases.

#### **Health and Physical Activity Behaviour**

This psychology-based course examines how engagement in health and physical activity behaviours affect health outcomes across the lifespan, and how individual engagement can be changed by intervention and health promotion strategies. Upon completion of the course, students will gain an understanding of models of behavioural change that promote health and physical activity behaviours. Students will also learn to apply these models towards intervention design, development, and evaluation to encourage adoption and maintenance of physical activity amongst special populations.

## **Land and Food Systems** >

### Package A - Food Science and Sensory Evaluation (LFS A JULY) (#accordion-111a)

#### **Introduction to Food Science**

An introduction to key concepts related to the science of food: the Canadian food system, chemical and physical properties of foods, government regulations, food additives, food preservation techniques, food safety, and trends in foods for nutrition and health. You will learn to arrive at an informed position about controversial issues relating to the food that you will encounter as consumers in the marketplace, and that you hear about in the media. Come and explore activities of entomophagy (eating insects), molecular gastronomy, and 3-D food printing.

#### **The Science of Sensory Evaluation**

Sensory evaluation is used to evoke, measure, analyse, and interpret human responses to food products as perceived through the senses of sight, smell, touch, taste, and hearing. Food processing and manufacturing companies globally need to know the principles and practices of sensory evaluation to produce food products that meet quality control standards and consumer needs. The sensory characteristics of a food are critical in the development of new food products and determine their success in the marketplace. There are special challenges in sensory evaluation because people are subject to various environmental, psychological and culture biases, and pose ethical considerations. In this hands-on course, you will explore techniques used to generate and analyze sensory data. You will apply the sensory evaluation theory that you learn, by participating in evaluations as both panelist and sensory analyst. Field trips and laboratory activities will demonstrate and reinforce theory presented in the courses.

### Package B - Nutrition and Healthy Eating (LFS B JULY) (#accordion-111b)

#### **Essentials of Nutrition**

In this introduction to nutrition course, students will learn about nutrients: what they are, why they are important to health, recommended intakes, and common Canadian food sources. Controversial topics in nutrition are explored. Key concepts are emphasized through field trips to local food production and retail outlets and are an integral component of students' learning experiences. Upon completion of the course, students will be better equipped to sort out fact from fiction by applying their knowledge of nutrition to everyday scenarios and to their personal dietary choices.

#### **Healthy Cooking and Eating in Canada's Multicultural Context**

This course will focus on applying the nutrition concepts learned from Essentials of Nutrition. You will be enriched with hands-on cooking experience, tasting and discussions about food choices. You will learn fundamental cooking skills and how to modify recipes for better health. Students will work in small groups to prepare a wide variety of foods from the many cultures making up Canada's cultural mosaic. The instructor, a Registered Dietitian and Chef, will guide students in their cooking, help them explore the nuances of tasty foods they have prepared and lead discussions on how to ensure food is both delicious and healthy. Upon completion of the course, students should be able to demonstrate an understanding of fundamental knowledge and skills of food safety, the practical outcomes of recipe modification, an understanding of the role and interactions of ingredients in food preparation, and a variety of preparation techniques and their nutritional attributes.

## **Medicine** >

### Package A - Introduction to Clinical Medicine and Scientific Research in the Hospital Setting (MED A JULY) (#accordion-112a)

#### **Introduction to Clinical Medicine in the Hospital Setting**

In this number 1 choice by VSP Medicine students in the last 5 years you will visit a large hospital and see the active life of physicians in several specialties as they diagnose and treat patients. Explore a unique hands-on experience and visit the Emergency Room, Laboratories and other areas. Learn how to resuscitate patients in cases of emergency, and use quality simulators to do intubation, defibrillation, managing airways and intravenous lines. Learn how to take history and conduct a physical exam – and work with physician-educators to acquire skills that focus on cardiac, respiratory and neurological systems. Discuss hospital cases in a wide spectrum of diseases, present patient cases of acutely ill and injured patients such as those with a myocardial infarct or car accidents, as well as chronically ill patients such as those with rheumatoid arthritis. In small group learning style discuss common emergency complaints such as fever, abdominal pain and rash to learn foundation of medicine.

#### **Introduction to Scientific Research in the Hospital Setting**

Review the scientific basis for research in biology, pharmacology and disciplines of medicine and explore methods to learn advanced clinical (hospital and clinic based) study designs. Learn from senior doctors, investigators and scientists how to discover better treatments for severely ill patients and acute emergencies, discuss ethical conduct of studies in children and neonates, how to recruit patients and what can be done to improve patient care through scientific studies. The course is providing students with solid foundation to appraise primary literature in clinical disciplines including medicine. This course was oversubscribed for 5 years because it offers you exposure to senior and experienced doctors who do such research in a large hospital. Learn to read English medical literature and have an opportunity to discuss research opportunities in cases of emergency, chronic diseases and cancer. With other students and a doctor-mentor in a small group you will develop a research proposal that can be implemented in the future.

All participants must be at least 19 years of age.

#### Package B - Pharmacology and Literature Analysis in Science and Medicine (MED B JULY) (#accordion-112b)

##### **Pharmacology Through Case Studies**

You will experience an integrated approach to learning pharmacology through the use of simulated clinical cases specifically designed to highlight the fundamental principles. Knowledge acquisition from both the scientific and clinical perspectives will be supported through complementary lectures and small group exercises. You will have the chance to design and present your very own case study, incorporating the newly learned pharmacological concepts with your creativity and analytical skills. Through this educational model, you will explore the basic science and clinical applications of cardiovascular, respiratory, gastrointestinal, reproductive, endocrine and autonomic pharmacology, and their integration across multiple related disciplines.

##### **Primary Literature Analysis in Science and Medicine**

This course will empower you with an understanding of the scientific method and the important decisions that must be carefully considered in designing, conducting and communicating experimental studies, providing the foundation needed to adequately review and appraise primary literature in any clinical or basic science discipline. The resulting downstream consequences of poor experimental design and interpretation of results in informing (or formulating) evidence-based medicine and public opinion will also be explored. You will learn about the different types of studies that can be used to answer a research question, the major elements of an experiment, and the overall publication process. Through lectures, small group exercises and discussions, you will develop the skills necessary to critically evaluate study research questions, strategies of subject selection and randomization, and proper use of controls. You will learn to identify confounding factors such as inadequate study design, bias, and poor statistical analysis – intentional or not – and describe how they may impact the quality of the study and its conclusions. Finally, you will have the opportunity to practically apply this knowledge through a group critical analysis of literature presentation at the end of the course.

All participants must be at least 19 years of age.

#### Package C - Anatomy and Radiology: Interactive Learning to Enhance Understanding (MED C JULY) (#accordion-112c)

##### **Introduction to Anatomy Using a Hands-on Approach**

In this course students will cover foundational functional anatomy and how this relates to 2D and 3D perspectives in diagnostic imaging. Students will learn how systems of the human body are functionally and structurally related to each other. Thoracic anatomy will focus on the cardiovascular and pulmonary systems, abdominal anatomy on the digestive and renal system and pelvic anatomy on the reproductive systems. The musculoskeletal system will put an emphasis on functional aspects such as gait and use of the hand. This course will give a basic foundation in functional anatomy as well as a spatial understanding that will correlate with approaches used in imaging.

##### **Introduction to Medical Imaging: Understanding Radiologic Normal Anatomy and Disease Using Cutting-Edge Technology**

This class will provide you with an introductory understanding of the imaging modalities (radiographs, ultrasound, CT and MRI, as well as interventional radiology) used to solve common clinical problems in all body systems. Considerable time will be spent reviewing imaging normal imaging anatomy and demonstrating the critical role that modern imaging plays in common disease, including cardiac, thoracic, abdominal, neurologic, and musculoskeletal disorders. The course will conclude with a presentation entitled: "Top Ten Do Not Miss Cases in Radiology."

All participants must be at least 19 years of age.

Package D - Biochemistry and Molecular Biology in Human Health, Disease, and the Environment (MED D JULY) \_(#accordion-112d)

**Molecular Mechanisms of Disease**

This course will provide an introduction to the molecular basis of disease and the concepts behind novel molecular therapies. Students will gain an understanding of fundamental human biochemical pathways and learn how molecular perturbations in these pathways can lead to disease. Several case-based topics will present research from world-renowned UBC faculty. The course will be taught through a combination of lectures, student presentations and problem-based learning all led by UBC experts. Course content will vary but may include topics such as the role of gut microbiota in health, cancer, diabetes, epigenetics, cardiovascular disease and significant global pathogens. Several novel therapeutic strategies will be discussed and may include genetically engineered gene/cell based therapies, stem cell cures, siRNA based expression control, and nanoparticle delivery systems.

**Biochemistry and Society: Current Issues**

This course will critically examine biochemical processes within the world at large and their impact on human health. The course will provide students with the scientific principles and concepts required to understand key interrelationships of the natural world and tackle the most daunting challenges of the 21st century. The course will be taught through a combination of lectures, student presentations and problem-based learning all led by UBC experts. Course content will vary but may include topics such as climate change, xenobiotics, endocrine disruptors, pollution by antibiotics and antibiotic resistance genes, and genetically modified organisms. Students will learn to appreciate the natural world from a molecular perspective and understand how biochemical perturbations within our environment impact human health.

All participants must be at least 19 years of age.

Package E - The Science Behind the Mind and Pharmacology in Psychiatry (MED E JULY) \_(#accordion-112e)

**The Science Behind the Mind**

This course will offer you an introduction to the mind and basic neuroanatomy emphasizing which brain structures play a role in the generation of normal and abnormal mental states. You will learn about the neurological basis of mental illness, the Mental Status Examination, the relationship of mental state phenomenology to brain function and dysfunction, and the modular nature of the brain structures and functions, all from Faculty experts. Invited guest instructors in various specialties offer perspectives and expertise that may include topics such as neuroimaging, genetics and psychiatry, and neuropsychology. Classes are a combination of interactive lectures and labs, with a possible fieldtrip.

**Psychiatric Disorders and their Pharmacological Treatments**

This course will cover the major psychiatric disorders that may include schizophrenia, major depressive disorder, anxiety, and bipolar disorder. You will learn from and engage with Faculty experts in each topic through interactive lectures and discussions. Over the duration of the course, you will learn the symptoms and neurobiology of these disorders, and how pharmacological therapies work to treat target symptoms. You will study the pharmacology of these drugs at the molecular level which will provide you with the foundation for understanding their clinical application. Finally, you will learn about treatment strategies using the most up-to-date evidence-based treatment guidelines.

All participants must be at least 19 years of age.

Package F - Major Mental Illnesses and Psychotherapy (MED F JULY) \_(#accordion-112f)

**Mood Disorders and Psychosis**

This course will provide you with a broad overview of mood disorders (such as clinical depression and bipolar disorder) and psychosis (where reality testing is impaired, such as in schizophrenia). Mood disorders and psychosis are among the most disabling psychiatric conditions worldwide, due to significant symptoms and functional impairments that can lead to both personal distress and substantial economic burden on society. A

major focus of this course will be identification and assessment, and accurate differential diagnosis. Additional topics will include epidemiology, neurobiology, psychosocial factors, and a variety of evidence-based interventions and therapies. Classes are lecture-based with group work and discussions.

#### **Introduction to Psychotherapy**

This course will provide you with an introduction to the theory and practice of psychotherapy, focusing on core principles and skills that can be applied across a range of clinical and practice contexts. The course will orient you to the evolution of psychotherapy as an evidence-based intervention for common mental health disorders. You will learn about the common elements of major models of psychotherapy within an integrative context. The course will emphasize integration across different psychotherapy orientations, as well as integration of psychotherapy principles across various helping practices. Thus, the course will introduce basic practical skills such as interviewing, assessment, and building and maintaining a therapeutic alliance—skills that can benefit all helping professionals working in various roles. Lectures will include video demonstrations of psychotherapy and role-playing exercises to develop practice skills.

All participants must be at least 19 years of age.

#### Package G - Introduction to Population and Public Health (MED G JULY) (#accordion-112g)

##### **Social Determinants of Health**

In this course you will broaden your understanding of how social factors, such as skin colour and income, affect population and public health. We will explore the meaning of health and its measurement, and examine what influences the health, well-being and quality of life of individuals, families, communities and nations. You will gain an understanding of the complex pathways through which social circumstances affect health and well-being, and hands-on experience thinking through real world problems. Lectures in class are followed by interactive group activities and trips outside of the classroom to explore health promotion services in Vancouver. This class will bring a new light to your understanding of the factors that affect health, and challenge you to think differently about what we can do as a society to decrease health inequities.

##### **Introduction to Population and Public Health Practice**

This course addresses the question of how we can respond to population and public health concerns. It introduces the student to key perspectives and frameworks that are used to inform activities that can improve the health of individuals, families, communities and nations. Potential approaches to preventing disease and improving health, such as a focus on the prevention of disease, screening for disease, the implementation of monitoring and surveillance systems, and the treatment of disease will be covered. Key frameworks such as types of prevention (i.e. primary, secondary, tertiary), and evaluating the cost and effectiveness of activities will also be considered.

All participants must be at least 19 years of age.

#### Package H - Understanding the Treatment and Recovery from Injury and Chronic Disease (MED H JULY) (#accordion-112h)

##### **Exercise is Medicine**

This course will provide an exploration of exercise and physical activity in the treatment of chronic health conditions. Through an exploration of chronic conditions such as arthritis, cancer, cognitive impairment, and cardiovascular disease, students will gain an appreciation of the effects of exercise on brain activation, bone and muscle health, and cardiovascular function. Topics will also include the epidemiology of physical inactivity across the world, measurement of physical activity in chronic disease, the role of health professionals in physical activity management, and mobile technology to promote physical activity in chronic disease. Students will use a variety of interactive methods to understand the content, including case studies, small group tutorials, and problem-based learning.

##### **Recovery from Injury and Disease**

This course will introduce students to the science of rehabilitation and recovery from injury and disease. Students will understand how severe injuries and chronic diseases can impact the patient and family, both physically and emotionally. Conditions such as spinal cord injury, concussion, stroke, arthritis, and chronic obstructive pulmonary disease will be used to illustrate the journey through rehabilitation, the road to recovery, and adjustment to disability. Students will be introduced to concepts about the musculoskeletal, cardiovascular, pulmonary, and neurological systems, as well as coping mechanisms and quality of life. In addition, cutting-edge research on novel rehabilitation treatments will be introduced, including visits to leading faculty laboratories. Students will use a variety of interactive methods to understand the content, including small group tutorials and problem-based learning.

All participants must be at least 19 years of age.

#### Package I - Medical Laboratory Science (MED I JULY) (#accordion-112i)

### **Introduction to Medical Laboratory Science**

You will explore normal and abnormal biochemistry and physiology of blood and organ systems including the liver, gastrointestinal tract, and kidneys. You will solve medical case studies and diagnose diseases by interpreting patient history information, physical findings, and results of selected clinical laboratory tests. You will participate in case-based learning, team presentations, interactive lectures, and a hands-on blood cell morphology laboratory session in which you prepare and stain blood smears, then distinguish different cells under the microscope. You will also take guided tours of clinical research lab facilities and the David Hardwick Pathology Learning Centre which houses tissue specimens representing a range of pathological conditions. Past students stated they "learned a lot—not only knowledge, but the way to get knowledge...and had lots of fun in this class". They valued team-work and interacting with instructors who were "very knowledgeable, approachable and kind".

### **Fundamental Techniques for Clinical and Medical Research Laboratories**

The focus of this course will be to perform methods that are commonly used in hospital and biomedical research laboratories. You will learn through hands-on laboratory sessions and will focus on the following disciplines: molecular biology, cell culture and histochemistry. Experiments you will conduct include DNA finger printing and culturing a mammalian cell line. You will also conduct a series of experiments using different staining techniques and microscopically determine the composition of unknown tissues. Your learning will be supported through demonstrations, discussions of experimental design, data analysis activities and interactive lecture sessions. Past students stated that they "enjoyed extracting and analyzing their own DNA" and that the cell culture labs were "very unique and interesting - something we cannot do in our home country." They were also "excited to analyze their slides and share with others during their histochemistry presentations".

All participants must be at least 19 years of age.

### Package J - Anatomical Sciences (MED J JULY) (#accordion-112j)

#### **Principles of Body Structure and Function**

This course will cover foundational functional anatomy including all major organ systems as well as the musculoskeletal system. Students will learn how these organ systems are functionally and structurally related to each other. Thoracic anatomy will focus on the cardiovascular and pulmonary systems, abdominal anatomy on the digestive and renal systems and pelvic anatomy on the reproductive system. The musculoskeletal system will be covered from a conceptual point of view focusing on functional anatomy of the upper and lower limbs.

#### **Introduction to Clinical Neuroanatomy**

This course will offer foundations of the neuroanatomy along with clinical applications. Students will be able to examine real specimens of the central nervous system which aids them to have a better understanding of the structure and function of the different parts of the central nervous system including; spinal cord, brainstem, and cerebrum. During this course student will have the opportunity to see and learn about the spinal nerves and cranial nerves. In addition, they will learn about some major functional features of the central nervous system such as; balance and equilibrium, hearing, speech, eye movements, and cognition.

All participants must be at least 19 years of age.

### Package K - Systems Pathophysiology, and Principles of Data Science in the Life Sciences (MED K JULY) (#accordion-112k)

#### **Data Science Applications in the Medical Sciences**

Presenting clear and reproducible data analysis is important for the integrity of scientific research from bench science to clinical trials. Students will be introduced to coding principles with the coding language R which has many popular tools available for analyzing biological data. Working in small groups, students will collaborate on small and large projects using publicly available data, and develop coding and debugging skills. The first half of the course will focus on basic coding foundation, with the second half exploring clinical data in mini-projects and a final group project. By the end of the class students will have a working knowledge of R which will allow them to explore and tackle the many types of life sciences data they may encounter in their future research in a systematic and reproducible manner. It is expected that students will have a laptop to follow along with the coding in class. No previous coding experience required.

It is expected that students will have a laptop to follow along with the coding in class. No previous coding experience required.

#### **Systems Pathophysiology**

By the end of this course, students will be able to appreciate the complexity of human physiology. In each disease theme, we will start with how the body functions normally and then explore the changes that make up abnormalities and how these changes lead to physiological diseases. Students will work in small groups throughout the course to collect data that they will then have a chance to analyze in the accompanying data science course. By the end of this course students will have a concrete understanding of how to use

equipment commonly used to evaluate physiological diseases and complete case studies based on current research.

All participants must be at least 19 years of age.

#### Package L - Biological and Clinical Aspects of Aging (MED L JULY) [\(#accordion-112l\)](#)

##### **Biological Aspects of Aging**

This course will provide an exploration of the biological underpinnings of aging and their individual and societal implications. It will give an introduction to the influence of normal aging on organs, cells, tissue, and chemical messengers and how these changes impact an individual's function. The impact of common age-related chronic conditions, such as osteoporosis, cerebrovascular disease, type 2 diabetes, and dementia will be discussed as they pertain to the global burden on healthcare systems. Students will use a variety of interactive methods to understand the content, including small group lectures, group presentations, and case studies. The group presentation component will provide students with the opportunity to practice critical appraisal of biological aging research through both an oral presentation as well as through peer-evaluation. Students will also visit several state-of-the-art research laboratories at the Center for Hip Health and Mobility, where they will be provided with hands-on experience.

##### **Clinical Aspects of Aging**

This course provides an introduction to clinical aspects of aging as well as factors that promote healthy aging. The course includes: 1) classroom lectures; 2) interactive group-learning; 3) hand-on labs; and 4) group-based coursework. An interdisciplinary group of researchers and clinicians will participate in the course and provide examples of aging research conducted at UBC and other academic institutions. Engaging speakers, visits to clinical research facilities and effective mentorship techniques will provide students with a once-in-a-lifetime opportunity to take part in the interdisciplinary learning in aging.

All participants must be at least 19 years of age.

#### Package M - Communication Disorders Across the Lifespan: Modern Perspectives (MED M JULY) [\(#accordion-112m\)](#)

##### **Typical and Impaired Communication Across the Lifespan**

This course will provide an overview of human communication skills. It will outline typical patterns of language development and changes across the lifespan, and will also describe developmental and acquired communication impairments. Students will be exposed to key concepts in the fields of audiology and speech-language pathology in order to gain a broad understanding of communication science, and the roles speech-language pathologists and audiologists play in serving the community. Topics will include developmental language delay, communication impairment in autism, hearing loss, aphasia, and motor speech impairments, amongst others. Through videos, guest speakers with communication impairments, and engagement with practicing clinicians, students will gain familiarity with common communication impairments.

##### **How Technology is Changing the Way We Communicate**

This course will explore the idea that modern technology is having a profound effect - both positive and negative - on the ways we communicate, and on our very ability to communicate. Students will learn about the impact of modern technology on childhood language development, on hearing health, and on populations with speech and language impairments. They will also investigate the ways in which technology is being harnessed to enhance treatment and expand communication between health care practitioners and their patients. Topics will include hearing assessment for infants, the effects of screen time on language development, cochlear implants, high tech assistive communication devices, the use of biofeedback devices in speech therapy, high fidelity patient simulation, and telehealth, amongst others. Students will have the opportunity to interact with cutting edge communication technology.

All participants must be at least 19 years of age.

#### Package N - The Underpinnings of the Practice of Emergency Medicine (MED N JULY) [\(#accordion-112n\)](#)

##### **Critical Presentations**

Emergency medicine is distinct in its focus on interpreting and diagnosing the cause of patient symptoms when they present with urgent or immediate need. A patient does not arrive saying they are having a heart attack; they usually arrive saying they are having chest pain. It is up to the emergency physicians to decide if this is: a) one of the life threatening causes of chest pain (myocardial infarction, pulmonary embolus, aortic dissection, tension pneumothorax); or b) one of the many non-life-threatening causes of chest pain (costo chondritis, chest wall muscle pain, pericarditis, pleurisy, esophagitis...).

Students will be taken through the diagnostic process in detail for frequent presentations such as chest pain, shortness of breath, headache, unconsciousness, palpitations, fever, transient weakness, seizure, acute allergic reaction and abdominal pain.

The setting will be a large class with interactive discussions, visuals of underlying pathophysiology and simulated emergency cases.

#### **Treatment for Common Emergencies and Principles of Research Study Design in the Emergency Setting**

Students will learn about common presentations in the emergency room and understand approaches to treatment along with potential challenges and concerns. Students will get simulated experience such as intubating an airway; a cricothyrotomy (surgical airway); inserting a needle or chest tube to treat pneumothorax; providing chest compressions (CPR); use of an automated external defibrillator for fatal heart rhythms; treatment of opioid overdose; giving epinephrine in anaphylactic shock; basic suture techniques; casting of upper and lower limbs; reduction of dislocated joints, and use of ultrasound for diagnosis and procedures.

Students will also be taught simple concepts of research study design within the constraints of the emergency room. They will have an opportunity to work through a specific research hypotheses and development of a feasible study design that will take into account the critical nature of the illness.

All participants must be at least 19 years of age.

#### Package O - From Conception to Life Saving Surgery Across the Life Span (MED O JULY) (#accordion-112o)

##### **Introduction to Women's Health: Normal Physiology and Clinical Challenges**

Students will be introduced to the subject of human reproduction and women's reproductive health over the life span. The course will cover both foundations of physiology and clinical aspects of care. Embedded Case-based learning (CBL) cases will provide insight into the biology and physiology of reproduction from embryonic development and conception, pediatric gynecology, to menopause and cancer. Teaching will be provided by scientists as well as clinicians.

This interactive course will highlight the many advances in this specialty. A tutorial on how to use technology to access the most relevant literature to solve a problem will be presented.

A wide exposure to common clinical challenges in the field will be achieved through didactic lectures augmented by student led presentations using CBL. Teams of students will be tasked with a clinical scenario to research and present to their fellow students at the end of each course. Hands on learning will be provided in sessions.

##### **The Specialty of Obstetrics and Gynecology: From the Bench to the Bedside**

This module builds upon the foundations of the first course and provides a deeper and more comprehensive exploration of this speciality. It will incorporate exposure to leading edge research and clinical facilities with visits to different world class laboratories, a tour of a fertility clinic laboratory and some hands-on learning in a surgical training laboratory at the Centre of Excellence for Simulation Education and Innovation (CESEI).

Students will expand their knowledge and further understanding of subspecialty medicine in Women's Health/Obstetrics and Gynecology with lectures from areas such as Reproductive Endocrinology, Gynecological Oncology, Pediatric Gynecology, Maternal Fetal Medicine, Urogynecology, Sexual Medicine, Infectious disease, Neonatology and so forth.

All participants must be at least 19 years of age.

#### Package P - Genomics and Genetics in Healthcare (MED P JULY) (#accordion-112p)

##### **Genetics and Genomics at the Intersection of Society, Ethics, and Healthcare**

This course provides foundational knowledge of genetic and genomic applications in healthcare. Students will be introduced to the key concepts of test interpretation and test utility, including the value, limitations and applications of different types of genetic tests across a range of disorders. Working independently and in small groups, students will critically evaluate genetic information. Building on this knowledge, students will gain insight into the lived experience of patients and families living with certain genetic conditions, and explore the potential impact of genetic testing across family members. Students will be introduced to key bioethical theories and in small groups will practice applying ethical concepts and decision making frameworks to clinical human genetics.

##### **Approaches to Genetic Disorders from a Genetic Counselling Perspective**

This course builds on the foundations learned in course A, as the students apply their knowledge to an in-depth examination of 4 different disorders with a genetic component from the genetic counselling perspective. Working first independently and later as a group, students will be asked to consider clinical, familial, psychosocial and societal implications for genetic testing and screening as they work through online cases on Down syndrome, phenylketonuria, and bipolar disorder. Cases are presented from an interprofessional, multidisciplinary perspective in order to build an understanding of the varied roles and responsibilities of health care professionals across the continuum of care. Working in small groups, students will select a disorder of

their choosing and present their case example to the class for group learning and discussion.

All participants must be at least 19 years of age.

## Nursing >

### Package A - Seniors Health and Home Care (NURS A JULY) (#accordion-113a)

#### **Introduction to Seniors' Health**

Field excursions to innovative seniors' care centres and effective mentorship techniques will provide students with a once-in-a-lifetime opportunity to take part in the most advanced learning in healthy aging and common health concerns among seniors. A broad range of guests (including older adults, healthcare providers and educators) will engage with students and provide content expertise. This course provides a window into normal aging processes and introduces students to some of the main health challenges experienced by seniors, including dementia. Best practices for supporting seniors' health and wellbeing will be discussed, guided by ethical considerations and principles of personhood. The course includes lectures, workshops and mentored individual projects by students that will be presented at the end of the course.

#### **Introduction to Caring for Seniors at Home and in the Community**

Students will gain hands-on experience in developing skills to effectively engage with and support seniors in their homes and communities. A wide variety of guests will engage with students, including seniors, family caregivers, and health and social service providers. Students will engage with seniors to consider practical tips to create supportive home environments. This course provides an overview of the key components of supporting the health and well-being of seniors in their home environment. Students will be introduced to issues associated with aging in place, including environmental, policy and systemic factors. The course will be led by expert faculty in the field of aging. Course content will be delivered through lectures, case studies, small and large discussion groups, and field excursions.

The content covered in NURS Package A: Seniors Health and Home Care is similar to foundational pillar courses in the Masters of Health Leadership and Policy (MHLP) Seniors Care program as a whole (NURS 542, NURS 585S); however, this course does not translate exactly into the content covered for either course due to condensed format.

### Package B - Interdisciplinary Global Health Leadership (NURS B JULY) (#accordion-113b)

#### **Global Health Leadership**

As we become more globalized and connected, health care providers have opportunities to lead the way for social justice and equity. This course will draw upon the World Health Organization's current program of work and the United Nations Sustainable Development Goals (SDGs) framework. Students will learn about leadership styles and strategies for global health advocacy work and policy development. Course discussions will highlight global health leadership in action for complex contemporary challenges such as climate change; human resources for health; good global governance; decent work; gender and age-transformative action; universal health coverage (UHC); and the "triple billion" goals. To lead globally, we have to think both locally and internationally, and students will have opportunities to meet local leaders who are champions for local Indigenous rights and cultural safety in Vancouver.

#### **Quality and Safety for Health Care**

In complex healthcare environments healthcare professionals must have the knowledge, skills and judgment to continuously monitor and improve: a) the safety of the work environment for patients and providers; and b) the quality and safety of patient care delivery. There are six key quality and safety competencies that will be covered in this course: patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety and informatics. Students will learn about real-life applications for each of these key competencies. This course will use cases of quality and safety practice challenges such as errors (including near misses), omissions and other breaches to engage students in group discussions and problem-solving. Guests will include Quality and Safety Officers, Informatics experts and Patient Experience Advocates from various healthcare organizations.

The course content NURS Package B JULY (Interdisciplinary Global Health Leadership) is covered in a number of courses, including NURS 300, NURS 351, NURS 360, NURS 512 & NURS 520. However, this course does not translate exactly into the content covered for the courses due to its condensed format.

### Package C - Mental Health and Wellness (NURS C JULY) (#accordion-113c)

#### **Introduction to Mental Health**

Using a life-course perspective addressing mental health from the prenatal period through older adulthood, students will build their understanding of the various mental health challenges, risk and protective factors, health system challenges and opportunities and evidence-based approaches to mental health promotion, prevention and treatment of common mental health challenges for individuals and their families. This course

provides students with a foundation for working with individuals, families, and populations who experience and are living with mental health and substance use challenges. This course includes lectures and discussion groups.

#### **Strategies to Manage Stress in Everyday Life**

Students will have the opportunity to explore knowledge related to stress, stressors, resilience, social support, and strategies to foster physical, mental, emotional, and spiritual health. Key concepts to be explored include the positive and negative aspects of stress, factors that contribute to stress, physiological and psychological responses to stress, and the various strategies to navigate and manage stress, including the role of social support and self-care. There will be a strong focus on practical strategies to manage stress within the context of students' current and future lives. The course will encompass a variety of methods including lectures, discussions, and an interactive assignment will allow students to express their creativity.

The content covered in NURS Package C JULY (Mental Health & Wellness) is similar to coursework covered in a few courses, NURS 303 and NURS 180. It is intended to support university students to advance their knowledge about mental health and wellbeing. However, these packaged courses do not translate exactly into the content covered in the courses due to its condensed format.

## **Pharmaceutical Sciences >**

### Package A - Making Better Medicines (PHAR A JULY) (#accordion-114)

#### **The Discovery of New Medicines**

What does it take to find a new drug? The objective of the course will be to answer this question introducing the participants to the drug discovery and development process. To do this we will start from the beginning, defining what we want our new drug to be, and then taking this new drug through each step of the drug discovery and development process up to and including clinical trials and approval. Each lecture will be devoted to a step of the process, with attention to the role of Pharmaceutical Sciences, and we will review these steps using case studies. In addition, participants will have an opportunity to visit the laboratories of a local research organization involved in supporting drug discovery efforts. By taking this course, participants will gain an active appreciation of the collaborative work that is required in the search for new therapies.

#### **Personalizing Medicines with Genomics and Biotechnology**

Today's pharmaceuticals are remarkable in their ability to target specific cancers, infectious agents and other ailments such as diabetes and heart disease. Yet despite their effectiveness, these medicines tend to treat all patients as members of one homogeneous population.

Next generation DNA sequencing is making the possibility of medicine tailored to an individual a reality. DNA sequencing can match your prescriptions to your genome. The integration of DNA sequencing with drug therapy has been a disruptive innovation, bringing the science of "big data" to medicine and pharmacy. In this course, we will explore how these and other innovations are revolutionizing healthcare and wellness.

Laboratory Component: In the laboratory we will isolate DNA and decode the sequence of these 'pharmacogenes'. We will then analyze these data to predict how we will respond to commonly prescribed medications.

## **Science – Chemistry >**

### Package A - Chemistry: Global Challenges and the Environment (CHEM A JULY) (#accordion-115)

#### **Tackling Global Challenges with Modern Chemistry**

Sustainability. Renewable energy. Nanomaterials. Clean water. Antibiotic resistance. This course explores upcoming challenges in modern society – and presents the impacts, analysis and potential solutions that modern investigators in the field of chemistry are actively studying. Students will be presented with case studies to explore the important problems facing our society.

#### **Environmental Chemistry of the Oceans and Atmosphere**

Picture Earth from Space—the Earth is a blue and white speckled gem. The blue of the sea. The white of the clouds in the Air. This course explores the chemical composition and reaction processes of the air and/or the seas. Case studies may involve the chemical processes associated with atmospheric interactions with solar radiation, the stratospheric ozone layer and the ozone hole, photochemical smog, air and water pollution, corrosion treatment and microbial transformations within natural waters.

Pre-requisite: 1st year university chemistry course. Familiarity of introductory level university chemistry is an asset for students interested in this course.

## **Science – Earth, Ocean and Atmospheric Sciences >**

Package A - The Dynamic Earth and its Beautiful Treasures (EOAS A JULY) [\\_ \(#accordion-116a\)](#)

**The Dynamic Planet**

This course considers how an active and evolving Earth system has created the planet we know today, one that supports diverse life and is rich in natural resources. Using international and Canadian examples, we will examine the origin of our planet and its composition and structure. From mountains to glaciers, earthquakes to volcanoes, ancient rocks and mighty dinosaurs, Canada is a wonderful natural laboratory that we will use to investigate our active and dynamic planet.

**Earth Treasures**

Canada is also known for its spectacular precious metals and gems, some of them housed in our departmental museum, The Pacific Museum of the Earth. This course investigates the formation, exploration, mining and aspects of marketing of gemstones and precious metals. We touch on topics such as fundamental scientific concepts, natural and synthetic gems and explore the world of fine jewelry. The origin, valuation and exploration strategies for gems such as diamonds and precious metals such as gold and platinum will be investigated here and placed into a fascinating international and Canadian geological context. Our emphasis is on active learning teaching methods where students are inspired to explore the subject matter through field trips, labs, discussions and in class activities.

Package B - The Earth's Oceans, Atmosphere and Climate (EOAS B JULY) [\\_ \(#accordion-116b\)](#)

**Ocean and Atmosphere Systems**

In this course you will assess and quantify the principal components of the global energy balance, how the energy balance affects the structure of the ocean and atmosphere and produces the winds and currents that control weather, air pollution and the biosphere. You will examine ocean productivity and the important geochemical cycles of carbon, nitrogen and phosphorous, and how over geologic time, ocean and atmospheric processes coupled with the evolution of the life to regulate climate and climate change.

**Marine Biodiversity**

Students will explore the incredible diversity of marine ecosystems, and identify the factors that regulate ocean habitats and how marine ecosystems develop in response. Ecosystems' properties, including diversity, resilience (or lack of resilience) to environmental change and its impact on neighboring ecosystems will be considered. The fascinating marine ecosystems and habitats to be studied include hydrothermal vents, intertidal zone, coral reefs, estuaries, deep sea, and polar ecosystems. A particular emphasis will be placed on our beautiful and diverse local marine ecosystems. Examine the responses of ecosystems disturbances, the evolution of ocean plankton, invasive species, climate change and pollution. Our emphasis is on active learning teaching methods where students are inspired to explore the subject matter through field trips, labs, discussions and in class activities.

**Science – Institute for Resources, Environment and Sustainability [➤](#)**

Package A - Climate Change, Energy and Society (IRES A JULY) [\\_ \(#accordion-118a\)](#)

**Climate Change: Causes, Consequences and Adaptation**

Climate change resulting from the use of fossil fuels in the global energy system is perhaps the single greatest collective challenge facing society in the 21st century. This course will explain the science behind human induced climate change, and examine possible consequences and impacts across the world. We will study how experts make predictions of future climate change and its impacts, and how societies will need to re-organize their economies and institutions to adapt to new climate realities. This course will include field trips and presentations by industry guest speakers, as well as speakers from non-governmental organizations and the public sector.

**Energy for Sustainable Development**

Climate change is only one of many challenges we face, and large-scale innovation in energy systems will be needed to meet multiple objectives including reducing greenhouse gas emissions. Technological and business innovations have begun to transform the global energy system. From the development of renewables such as solar and wind, to the deployment of complex networked technologies (such as Electric vehicles), or the diffusion of novel 'mundane' technologies (such as improved cook stoves in the developing world), technological innovation holds the key to our energy future. This course will examine what is driving these innovations, how might their promise be reached and their benefits be maximized, and what social and policy efforts are needed to sustain them. This course will include field trips and presentations by industry guest speakers, as well as speakers from non-governmental organizations and the public sector.

**Science – Integrated Sciences [➤](#)**

### **Game Theory**

Game theory is the study of mathematical models of conflict and cooperation between intelligent rational decision-makers. As such it is applicable to a wide range of behavioral relations, and is now an umbrella term for the science of logical decision making in computers and organisms. Game theory has been widely recognized as an important tool in many fields including computer science, biology, economics, political science and psychology. In this course we will consider representations of games (normal, extensive, and characteristic-function forms), game types (cooperative/non-cooperative, symmetric/asymmetric, zero-sum/non zero-sum, simultaneous/sequential, etc.), history, awards, and game theory in popular culture.

### **Symmetry**

The mathematic definition of symmetry is that an object is invariant to various transformations; including reflection, rotation, or scaling. Mathematical symmetry may be observed with respect to spatial relationships, through geometric transformations and other kinds of functional transformations, with respect to the passage of time, as an aspect of abstract objects, theoretic models, music, and language. Symmetry in everyday language refers to a sense of harmonious proportion and balance. In this course we investigate symmetry and asymmetry in mathematics, physics, chemistry, and biology, and in the arts, specifically architecture, fine art, and music.