Carnegie Mellon University
Pre-College Summer Session

2024 Pre-College Summer Session Course List

This course list was updated on 04-23-2024. *See the last page of this document for changelog.*

Courses meet daily unless otherwise noted. Full courses at Carnegie Mellon carry 9 to 12 units, corresponding to 3 to 4 credits at other U.S. colleges and universities.

Pre-College Summer Session students are allowed to enroll in **24 or fewer units**, because the courses in this six-week summer term cover material from the longer fall and spring semesters and we have found students who enroll in excessive units cannot experience everything Pre-College Summer Session has to offer. Students who enroll in 24 units may be expected to study challenging Carnegie Mellon academic material for at least 57 hours every week. For more information, contact the Pre-College Summer Session Director, Dr. Gillian Ryan (gryan@andrew.cmu.edu).

Newly listed or revised courses for the Pre-College Summer Session in 2024 include:
21-120 Differential and Integral Calculus
70-122 Introduction to Accounting
76-221 Books You Should Have Read By Now
80-211 Logic and Mathematical Inquiry
80-212 Arguments and Logical Analysis
82-183 AI for Humanities: The Multi-dimensions of World Languages, Arts, and Cultures
82-269 Immersive Digital Storytelling: Using VR/AR to Explore, Language Culture Identity

Up-to-date information on course availability can be found via the Pre-College Summer Session webpage.

Some of the courses in the following list are designated only for Pre-College Summer Session, while some enroll both Pre-College Summer Session students and undergraduate students. In either case, all Summer Session courses offer the same quality of instruction and expectation of work as during the fall or spring at Carnegie Mellon.

After reviewing these course descriptions and, if needed, consulting with the Pre-College Summer Session Director about course choices, select your courses using the Pre-College Summer Session Course Request Form in the Pre-College Student Portal. Students will have access to the form through this portal after they are admitted to the Pre-College Summer Session program.

Courses fill in the order that deposits and forms are received by the University, including when the course request form is completed. For Computer Science courses that require the completion of an assessment test for placement, the date of completion of that assessment also factors into the order in which students are enrolled in those courses.

Pre-College Summer Session students do not enroll themselves in courses. They are enrolled based on their course availability and their course selections on the Pre-College Summer Session Course Request form. Enrollment is subject to completion of any required assessments and meeting required placement scores as well as course availability. To view your course schedule once you are enrolled in classes, visit Student Information Online on the HUB's website (www.cmu.edu/hub/sio) using your Carnegie Mellon University Andrew ID and password.

Please allow time for the receipt and processing of your payment and enrollment forms. Please note that your account on SIO will indicate that you have a registration hold. All Pre-College Summer Session students have such a hold on their account, which prevents you from adding or dropping courses without approval from the Pre-College team.

Students may request schedule changes until the end of the second day of classes by contacting the Pre-College Summer Session Director. No schedule changes will be possible after this time. Family members should not contact the Pre-College Summer Session Director regarding course selection; students are responsible for communicating with their family about any changes to their academic plans.

Units	Course #	Course Title **	Meeting Times
9	03-121E	Modern Biology	MTWRF 9:30a – 10:50a
9	03-124E**	Modern Biology Lab***	MW 12:00p – 3:20p
9	03-132E	Basic Science to Modern Medicine	MTWRF 2:00p – 3:20p
9	03-133E	Neurobiology of Disease	MTWRF 11:00a – 12:20p
9	03-232E**	Biochemistry I	MTWRF 12:30p – 1:50p
10	09-105E	Introduction to Modern Chemistry I	MTWRF 11:00a – 12:20p **and** T 2:00p – 2:50p
10	15-110E*	Principles of Computing	MTWRF 9:30a – 10:50a **and** MTWRF 3:30p – 4:20p
12	15-112E*	Fundamentals of Programming and Computer Science	MTWRF 11:00a – 12:20p **and** MTWRF 5:00p – 5:50p
12	15-122E*,**	Principles of Imperative Computation	MTWRF 9:30a – 10:50a **and** MTWRF 12:30p – 1:50p
10	21-120E	Differential and Integral Calculus **NEW**	MTWRF 9:30a – 10:50a
12	21-127E**	Concepts of Mathematics	MTWRF 11:00a – 12:20p
11	21-241E	Matrices and Linear Transformations	MTWRF 12:30p – 1:50p
9	27-052E	Introduction to NanoScience and Technology	MWF 2:00p – 3:20p
9	33-124E	Introduction to Astronomy	MTWRF 2:00p – 3:20p
12	33-141E**	Physics I for Engineering Students	MTWRF 12:30p – 2:50p
9	36-200E	Reasoning with Data	MTWRF 12:30p – 1:50p
9	36-202E**	Methods for Statistics & Data Science	MTWRF 11:00a – 12:20p
9	57-341E	Sound Recording Workshop	MWF 2:00p – 3:20p **and** MW 6:30p – 7:50p
9	70-122E	Introduction to Accounting **NEW**	MTWRF 9:30a – 10:50a
9	73-102E	Principles of Microeconomics	MTWRF 11:00a – 12:20p
9	76-101E	Interpretation and Argument	MTWRF 9:30a – 10:50a
9	76-221E	Books You Should Have Read By Now **NEW**	MTWRF 9:30a – 10:50a
9	80-100E	Introduction to Philosophy	MTWRF 12:30p – 1:50p
9	80-130E	Introduction to Ethics	MTWRF 11:00a – 12:20p
9	80-211E	Logic and Mathematical Inquiry **NEW**	MTWRF 2:00p – 3:20p
9	80-212E	Arguments and Logical Analysis **NEW**	MTWRF 3:30p – 4:50p
9	82-183E	AI for Humanities: The Multi-dimensions of World Languages, Arts, and Cultures **NEW**	MTWRF 9:30a – 10:50a
9	82-269E	Immersive Digital Storytelling: Using VR/AR to Explore, Language Culture Identity **NEW**	MTWRF 11:00a – 12:20p
~~9~~	~~85-102E~~	~~Introduction to Psychology~~ **CANCELLED**	~~MTWRF 12:30p – 1:50p~~
9	85-241E	Social Psychology	MTWRF 2:00p – 3:20p

If you sign up for a course with multiple times (indicated by "**and**"), you must be available during all of those times.

* Placement into 15-110, 15-112, or 15-122 requires an appropriate score on a CS Placement test. Details are in the course description. **Note that students may only take <u>one</u> of these courses**.

** Please see the course description for required prerequisites or corequisites. You will be asked to provide support of meeting these when selecting your desired courses through your Student Portal.

***Additional lab fees apply. These will be billed to your Student Account.

03-121 Modern Biology (9 units)
This is an introductory course that provides the basis for further studies in biochemistry, cell biology, genetics, and molecular biology. This course emphasizes the chemical principles underlying biological processes and cell structures as well as the analysis of genetics and heredity from a molecular perspective. This is the introductory biology course for all science and non-science majors. The course will cover: (1) the molecular basis of life including DNA, RNA, and protein structure and function, (2) the connection between the above concepts and ideas from chemistry and physics, (3) Genetic inheritance and the relationship to the ideas above and to diseases, (4) How to interpret biological experiments, (5) Animal function including communication between cells & development, (6) Basics of evolution.

03-124 Modern Biology Lab (9 units) - Additional lab fees apply. These will be billed to your Student Account.

Corequisite: 03-121 Modern Biology. This lab can only be taken by students also taking 03-121, or who have successfully completed 03-121 in the past.

This laboratory is designed to introduce students to modern concepts in the biological sciences. The experiments illustrate many of the principles covered in 03-121. Experimentation using living organisms and/or their tissues, cells or molecules is an essential component of this course. The course will cover current techniques in biological research and how to design experiments using these techniques: manipulations of microorganisms, viable count, plasmid DNA isolation, UV spectroscopy, DNA and protein gel electrophoresis, restriction enzyme digests and mapping, bacterial transformations, Bradford assay, western blot analysis, modeling UV exposure, nucleosome fragmentation assay.

03-132 Basic Science to Modern Medicine (9 units)
The goal of this course is to give students an understanding of the biology that impacts their everyday lives. Disease can be a tragic part of human life, a fact that is even more apparent during a global pandemic. To understand how specific diseases like COVID-19 or cancer affect the human body, and how modern medicine can tackle them, this course includes a fundamental study of the basic molecular biology, genetics, and cell biology that underlies disease. This is a topics-based course, with topics chosen to cover aspects of biology and health that students are likely to encounter in their daily lives. The topics for summer 2024 will include COVID-19, genome editing, and cancer. We will explore these topics from both a basic science and a modern medicine perspective. Students will gain the expertise to critically evaluate media reports about biology and health, and to ask the questions that will help them to make educated decisions in their lives. Key topics: The course will cover at least COVID-19, cancer, and genome editing, in addition to the essential aspects of molecular biology, cell biology, and genetics needed to understand those topics.

03-133 Neurobiology of Disease (9 units)
This course will explore the biological basis of several neurological and neuropsychiatric diseases, with an emphasis on medical diagnostic tools and techniques. It will include discussions of the anatomical basis of neurological diseases as well as recent research into understanding the mechanisms of disease. This course is intended to broaden students' understanding of how diseases are diagnosed and studied. Students will also learn how basic neurological and psychiatric evaluations are conducted. We will discuss neurobiological research to serve as a basis for understanding brain structures and functional alterations in a variety of developmental, degenerative, neurological, and psychiatric disorders.

03-232 Biochemistry I (9 units)

Prerequisite: Strong preparation in chemistry (e.g. 5 on AP Chemistry) required. High school biology is very strongly recommended.

This course provides an introduction to the application of biochemistry to biotechnology. The functional properties of amino acids, nucleotides, lipids, and sugars are presented. This is followed by a discussion of the structural and

thermodynamic aspects of the organization of these molecules into higher-order structures, such as proteins, nucleic acids, and membranes. The kinetics and thermodynamics of protein-ligand interactions are discussed for non-cooperative, cooperative, and allosteric binding events. The use of mechanistic and kinetic information in enzyme characterization and drug discovery are discussed. Topics pertinent to biotechnology include: antibody production and use, energy production in biochemical systems, expression of recombinant proteins, and methods of protein purification and characterization.

09-105 Introduction to Modern Chemistry I (10 units)
This course begins with a very brief survey of some fundamental principles of chemistry and a presentation of chemically interesting applications and sophisticated problems. These will form the basis for introducing the relationships between the structure of molecules and their chemical properties and behavior. The subject matter will include principles of atomic structure, chemical bonding, intermolecular interactions and molecular structures of organic and inorganic compounds including some transition metal complexes. Relevant examples will be drawn from such areas as environmental, materials, and biological chemistry.

15-110 Principles of Computing (10 units)
**A placement exam is required to determine eligibility for registration in this class.*

A course in fundamental computing principles for students with minimal or no computing background. Programming constructs: sequencing, selection, iteration, and recursion. Data organization: arrays and lists. Use of abstraction in computing: data representation, computer organization, computer networks, functional decomposition, and application programming interfaces. Use of computational principles in problem-solving: divide and conquer, randomness, and concurrency. Classification of computational problems based on complexity, non-computable functions, and using heuristics to find reasonable solutions to complex problems. Social, ethical and legal issues associated with the development of new computational artifacts will also be discussed.

15-112 Fundamentals of Programming and Computer Science (12 units)
**A placement exam is required to determine eligibility for registration in this class.*

A technical introduction to the fundamentals of programming with an emphasis on producing clear, robust, and reasonably efficient code using top-down design, informal analysis, and effective testing and debugging. Starting from first principles, we will cover a large subset of the Python programming language, including its standard libraries and programming paradigms. We will also target numerous deployment scenarios, including standalone programs, shell scripts, and web-based applications. This course assumes no prior programming experience. Even so, it is a fast-paced and rigorous preparation for 15-122. Students seeking a more gentle introduction to computer science should consider first taking 15-110.

15-122 Principles of Imperative Computation (12 units)
**A placement exam is required to determine eligibility for registration in this class.*

Corequisite: 21-127 Concepts of Mathematics. This class can only be taken by students also taking 21-127, or who have successfully completed 21-127 in the past.

For students with a basic understanding of programming (variables, expressions, loops, arrays, functions). Teaches imperative programming and methods for ensuring the correctness of programs. Students will learn the process and concepts needed to go from high-level descriptions of algorithms to correct imperative implementations, with specific application to basic data structures and algorithms. Much of the course will be conducted in a subset of C amenable to verification, with a transition to full C near the end.

**Computer Science Placement Exams: To ensure students are prepared for requested CS courses, Pre-College Summer Session students who seek to enroll in 15-110 ,15-112, or 15-122 must complete CS placement exams administered by CMU. Because of the fast-paced nature of summer courses this is required even if students have AP credit for computer science. Information about the exam will be sent to students who have listed 15-110, 15-112, or 15-122 on their course request forms. Students will be enrolled in these courses only after their placement exams are scored. Note that students may only take one of these courses.*

21-120 Differential and Integral Calculus (10 units)
Functions, limits, derivatives, logarithmic, exponential, and trigonometric functions, inverse functions; L'Hopital's Rule, curve sketching, Mean Value Theorem, related rates, linear and quadratic approximations, maximum-minimum problems, inverse functions, definite and indefinite integrals, and hyperbolic functions; applications of integration, integration by substitution and by parts.

21-127 Concepts of Mathematics (12 units)

Prerequisite: Concepts of Mathematics requires prerequisite knowledge of all students, including Pre-College students, before enrolling in the course. This knowledge can be demonstrated by passing grades in CMU courses such as 15-112 (Fundamentals of Programming and Computer Science) or 21-120 (Differential and Integral Calculus). Equivalently, students could have scored 5 on the College Board AP Computer Science A exam, 5 on the Calculus AB or Calculus BC exam; 6 or 7 on the International Baccalaureate Higher Level Computer Science exam, 6 or 7 on the IB Mathematics HL exam; A on the Cambridge International/EdExcel Advanced Level or Singapore H2 level in Computer Science, or A or B in the Mathematics C/Advanced Math. Some courses taken at other colleges may also be considered equivalent. *The course request form will provide you an opportunity to describe your prior background in CS and/or math.*

This course introduces the basic concepts, ideas and tools involved in doing mathematics. As such, its main focus is on presenting informal logic, and the methods of mathematical proof. These subjects are closely related to the application of mathematics in many areas, particularly computer science. Topics discussed include a basic introduction to elementary number theory, induction, the algebra of sets, relations, equivalence relations, congruences, partitions, and functions, including injections, surjections, and bijections. A basic introduction to the real numbers, rational and irrational numbers. Supremum and infimum of a set.

21-241 Matrices and Linear Transformations (9 units)
A first course in linear algebra intended for scientists, engineers, mathematicians and computer scientists. Students will be required to write some straightforward proofs. Topics to be covered: complex numbers, real and complex vectors and matrices, rowspace and columnspace of a matrix, rank and nullity, solving linear systems by row reduction of a matrix, inverse matrices and determinants, change of basis, linear transformations, inner product of vectors, orthonormal bases and the Gram-Schmidt process, eigenvectors and eigenvalues, diagonalization of a matrix, symmetric and orthogonal matrices.

27-052 Introduction to NanoScience and Technology (9 units)
The course is primarily intended to provide an introduction to nanoscience and technology to a wide audience of students at the advanced high school to incoming freshmen level. The course goals are twofold: (1) to provide students with a holistic view of the objectives, opportunities and challenges of the emerging field of nanotechnology and 2) to sensitize students at an early stage of their career to the relevance of the connections among the traditional disciplines as a vital element to the progress in interdisciplinary areas such as nanotechnology. The course will cover: Introduction and fundamental science; Preparation of nanostructures; Characterization of nanostructures; Application examples, Social and ethical aspects of nanotechnology.

33-124 Introduction to Astronomy (9 units)
Astronomy continues to enjoy a golden age of exploration and discovery. This course presents a broad view of astronomy, straightforwardly descriptive and without any complex mathematics. The goal of the course is to encourage non-technical students to become scientifically literate and to appreciate new developments in the world of science, especially in the rapidly developing field of astronomy. Subjects covered include the solar system, stars, galaxies and the universe as a whole. The student should develop an appreciation of the ever-changing universe and our place within it. Computer laboratory exercises will be used to gain practical experience in astronomical techniques. In addition, small telescopes will be used to study the sky. This course is specifically geared toward non-science/engineering majors.

33-141 Physics I for Engineering Students (12 units)

Corequisite: 21-120 Differential and Integral Calculus. This class can only be taken by students also taking 21-120, or who have successfully completed 21-120 in the past. We will accept strong preparation in calculus (e.g, 5 on AP Calculus AB or Calculus BC exam) in place of this corequisite; high-school physics very strongly recommended.

This is a first semester, calculus-based introductory physics course. Basic principles of mechanics and thermodynamics are developed. Topics include vectors, displacement, velocity, acceleration, force, equilibrium, mass, Newton's laws, gravitation, work, energy, momentum, impulse, torque and angular momentum, temperature, heat, equations of state, thermodynamic processes, heat engines, refrigerators, first and second laws of thermodynamics, and the kinetic theory of gases.

36-200 Reasoning with Data (9 units)
This course will serve as an introduction to learning how to "reason with data". While still an introductory-level course in the Statistics Department, the focus will be more on thinking about the relationship between the application and the data set and extracting useful statistical information rather than taking primarily a formula-driven approach. There will be an emphasis on thinking through an empirical research problem from beginning to end. Types of data will include continuous and categorical variables, images, text, and networks. Applications will largely draw from interdisciplinary case studies spanning the humanities, social sciences, and related fields. Methodological topics will include basic exploratory data analysis, elementary probability, hypothesis tests, and empirical research methods. There is no calculus or programming requirement. There will be weekly computer labs for additional hands-on practice.

36-202 Methods for Statistics and Data Science (9 units)

Prerequisite: Reasoning with Data (36-200), or equivalent knowledge (e.g., AP Statistics with score 4 or higher, Cambridge A Level “Further Mathematics C” with grade of B or higher, prior college-credit statistics course with passing grade)

This course builds on the principles and methods of statistical reasoning developed in 36-200 (or its equivalents). The course covers simple and multiple regression, analysis of variance methods and logistic regression. Other topics may include non-parametric methods and probability models, as time permits. The objective of this course is to develop the skills of applying the basic principles and methods that underlie statistical practice and empirical research. Learning the Data Analysis Pipeline is strongly emphasized through structured coding and data analysis projects. In addition to three lectures a week, students attend a computer lab twice a week for "hands-on" practice of the material covered in lecture; students will learn the basics of R Markdown and related analytics tools.

57-341 Sound Recording Workshop (9 units)
Centers around the new recording studio in the School of Music: how the studio works and how to record various types of music, using the recording studio and the Kresge Recital Hall, which has audio and video links to the recording studio. The method of instruction is to learn by doing, and the goal is to achieve professional- sounding results. Equipment includes a complete 24-track Pro-Tools system, professionally designed control room and an interesting array of

microphones. All recording is direct to hard disc. The lecture portion will cover the basics of sound, wave propagation, human hearing, psychoacoustics, transducers (microphones and speakers), mixing consoles, signal processors, digital and analog recording systems and signal flow. There are no specific prerequisites for the course, although reading music and/or playing an instrument is helpful.

70-122 Introduction to Accounting (9 units)
This course provides the knowledge and skills necessary for the student to understand financial statements and financial records and to make use of the information for management and investment decisions. Topics include: an overview of financial statements and business decisions; the balance sheet, the income statement, and the cash flow statement; sales revenue, receivables, and cash; cost of goods sold and inventory; long-lived assets and depreciation, and amortization; current and long-term liabilities; owners' equity; investments in other corporations; an introduction to financial statement analysis and international issues dealing with financial statements.

73-102 Introduction to Microeconomics (9 units)
A one-semester course that teaches the fundamentals of microeconomics. Students will learn how microeconomic analysis can explain market successes, market failures, and how government intervention might improve outcomes. In addition to an investigation of firm behavior and consumer behavior, attention will be paid to: Game Theory, Behavioral Economics, Economics of Time and Risk, Economics of Information, Experimental Economics, and Auctions and Market Design. Students will also learn how to integrate basic data analysis and statistics.

76-101 Interpretation and Argument (9 units)
76-101 introduces first-year students to an advanced, inductive process for writing an argument from sources. Because the course is based upon empirical research about professional academic writers, students will learn expert practices for authoring their own arguments that contribute to an existing community of authors. Because reading and writing are inseparable practices for academic writing, students will read a variety of texts so that they can explore and critically evaluate a single issue from multiple perspectives and from different disciplinary genres. Students will learn methods for summarizing, synthesizing, and analyzing arguments within that issue so that they may contribute an argument of their own. The course is also geared toward helping students understand the requirements of advanced college-level writing. Our students are typically very accomplished readers and writers, and we are eager to push their accomplishments toward greater excellence. For this purpose, students will build upon their composing knowledge by reflecting and thinking strategically as they plan, write, and revise their own texts. Ultimately, they will develop critical reading, rhetorical and linguistic practices for analyzing and producing texts within the context of an academic community. Each section of 76-101 is structured by the same objectives and core assignments. There is a core vocabulary and set of heuristics that all sections teach. However, students may find particular issues more appealing than others - we encourage students to pursue their interests, but we also ask that students engage any 76-101 course with intellectual curiosity.

76-221 Books You Should Have Read By Now (9 units)
Topics vary by semester: Summer 2024: Asian American Literature: What defines Asian American literature, and how do Asian American authors aesthetically explore Asian American identity within their works? How is Asian American identity constructed, and in what ways does Asian American literature illuminate, challenge, or perpetuate this identity? This course offers an overview of the history of Asian American literature, delving into how contemporary Asian American literary works reflect and respond to pertinent sociopolitical issues. To explore a diverse range of Asian ethnicities and Asian American experiences, texts are drawn from writers of Indian, Japanese, Chinese, Vietnamese, and Korean descent. We will be reading Karen Tei Yamashita's Tropic of Orange (1997), Ken Liu's The Paper Menagerie and Other Stories (2016), Ocean Vuong's On Earth We're Briefly Gorgeous (2019), Steph Cha's Your House Will Pay (2019), and Jhumpa Lahiri's Translating Myself and Others (2022).

80-100 Introduction to Philosophy (9 units)
In this introductory course we will explore three major areas of Philosophy: Ethics, Metaphysics, and Epistemology.

Accordingly, the course is divided into three sections. In each section we will read primary sources and discuss some of the main philosophic problems associated with that area. These will include: moral problems (Ethics), problems rising from the debates about free-will, personal identity or intelligence (Metaphysics), and inquiries about the scope and limits of human knowledge (Epistemology). We will then introduce some theories designed to solve such problems, and try to understand the strengths and weaknesses of these theories. We will apply different techniques and theories to issues that we might encounter in the real world. We will use class discussions, homeworks and papers to learn skills for evaluating arguments. These skills include: how to present a philosophic argument, what are the assumptions that justify it, what are its weaknesses and its strengths, whether such weaknesses can be resolved and, if they cannot be resolved, why.

80-130 Introduction to Ethics (9 units)
Philosophical ethics, or moral philosophy, covers a lot of ground. It asks and tries to answer questions like: What's good in life? What matters? What should I (and others) do? How should I (and others) act? What kinds of things out there must be treated ethically? Do we have moral duties to (at least some) non-human animals? Is morality subjective? Are there actually any objective moral truths? Morally speaking, what (if anything) is the difference between killing someone, and simply letting them die? In trying to answer these questions (and others), we'll engage in some wonderfully weird thought experiments, class discussions, smaller group discussions, debates, etc. We'll study and critique several moral theories which try to explain and help guide our moral judgments, and we'll try to apply these theories to real-life moral controversies. Past classes covered topics including drug prohibition, abortion, euthanasia, and physician-assisted suicide. This is an introductory philosophy class, so you'll be learning how to read, critique, do, and write philosophy generally, not just ethics. Considerable time and effort, both in lectures and in recitations, will be spent helping you learn to recognize and evaluate philosophical arguments, as well as empowering you to create, improve, and defend your own arguments in class assignments.

80-211 Logic and Mathematical Inquiry (9 units)
Since ancient times, mathematical arguments have served as a paradigm for rational inquiry. We will study fundamental mathematical concepts and informal proofs as they occur in everyday mathematics. We will also use the methods of mathematical logic, which provides formal symbolic languages, to help us understand the structure of a mathematical argument. Finally, we will make use of a new computational "proof assistant," called Lean, to develop fully rigorous, machine-checked proofs.

80-212 Arguments and Logical Analysis (9 units)
Are there rational methods that can further our knowledge? The notion of rational inquiry presupposes that there are appropriate methods for the pursuit of knowledge. In this course, we will investigate the means by which a successful argument justifies its conclusion, as well as various subtle ways in which other arguments fail. The course will explore the use of logic as an instrument in the study of arguments and reasoning, and it will serve as a gentle introduction to the elementary concepts of formal logic. We will take a historically informed approach to studying logic and argumentative fallacies, and we will discover that logical tools and methods are useful for constructing and analyzing arguments in all disciplines, from philosophy and history to psychology and physics. Our goals are to acquire a solid grasp of some fundamental tools of modern logic, and learn how to use them to make our thinking and writing clearer, more precise, and more critical. To this end, our coursework will consist in homework and exams on topics in logic, as well as writing assignments on a variety of topics. This course is intended for students from any discipline who would like to improve their writing and critical thinking skills, as well as students who are interested in learning logic without having had prior contact with the subject.

82-183 AI for Humanities: The Multi-dimensions of World Languages, Arts, and Cultures (9 units)
Dive into the thrilling world where AI meets humanities! In this dynamic course, you will see how cutting-edge AI intertwines with the vibrant threads of global languages, arts, and cultures. Through engaging lectures, hands-on activities, and innovative projects, you'll unearth the transformative potential of AI in changing our understanding of

language learning, artistic expression, and cultural immersion. We've broken down this adventure into three exciting modules: Module 1: LLMs & Second Language Acquisition Our first stop focuses on Large Language Models (LLMs) and their profound impact on second language acquisition. This exploration will deepen students' understanding of AI's role in bridging linguistic barriers and fostering global communication. Module 2: Generative Models and Artistic Expression This module reveals the magic behind generative models in artistic creation. Experiment with tools like auto-encoders and diffusion models, students will discover how AI acts as a catalyst for artistic innovation and kindles creativity. Furthermore, students will contemplate both the potential and constraints of AI in pushing the frontiers of artistic expression. Module 3: Social and Cultural Voyages with AI Discover how AI can let you virtually step into various cultural traditions and social viewpoints. This exploration will not only illuminate how AI can be harnessed to create enhanced cultural and social learning experiences, but also encourage students to approach AI with a discerning eye. By the end of this course, students will command a comprehensive understanding of AI technologies and an enduring appreciation of its intricate relationship with the humanities. They will emerge well-prepared to navigate the ever-changing landscape of AI-enhanced language education, cultural exploration, and artistic expression, all from a global perspective.

82-269 Immersive Digital Storytelling: Using VR/AR to Explore, Language Culture Identity (9 units)
In this course you will enjoy a series of remote and then in-person workshops, setting the groundwork for their own practical projects. Often perceived as a technology of tomorrow, students will be introduced to storytellers and content creators currently working with Virtual and Augmented Reality and other Immersive media m to tell stories about people, communities, cultures, and histories in compelling and engaging ways. Using readily available smartphone apps and consumer-ready cameras and head-mounted displays, students will be able to create their own short immersive films and gain a better understanding of this important and emerging field. You will produce your own short digital story using the technologies that we explore through this class. Your story will explore themes of identity, language, and culture, asking you to relate experiences and reflect on ways that you connect and interact with cultures around you. We will ask questions about the affordances of immersive technologies, how we can use them to tell stories of culture and how creators and artists are different themes through their work.

~~**85-102 Introduction to Psychology** (9 units)~~ **SECTION CANCELLED**
~~This course examines major areas of scientific psychology in some depth, the attempt being to develop basic models of our behavior and thought that explain wide areas of our functioning. The primary focus is on the areas of neural and motivational control of behavior, memory and thought, social interaction, and psychological development. Specific topics within these areas include brain function, motivational control systems, learning, cognitive and perceptual information processing, problem solving, obedience and conformity, social interaction, emotion, attitude consistency and change, how our social, cognitive and language functions develop, the importance of childhood to adult functioning, and psychopathology. In addition to the lecture, the course includes a weekly recitation section meeting and weekly short WEB-based laboratory experiences in which students get to perform actual experiments, interpret real data, and experience many psychological phenomena.~~

85-241 Social Psychology (9 units)
The focus of this course will be on how peoples behavior, feelings and thoughts are influenced or determined by their social environment. The course will begin with lectures and readings on how social psychologists go about studying social behavior. Next, various topics on which social psychologists have done research will be covered. These topics will include: person perception, prejudice and discrimination, the nature of attitudes and how attitudes are formed and changed, interpersonal attraction, conformity, compliance, altruism, aggression, group behavior, and applications of psychology to problems in health care, law, politics, and the environment. Through readings and lectures on these topics, students will also be exposed to social psychological theories.

If you have questions about courses or scheduling, please contact:
Dr. Gillian Ryan, Pre-College Summer Session Director, Carnegie Mellon University

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The university reserves the right to add, change, or cancel class times and/or course offerings without notice.

Other courses may become available. Please check the Pre-College Summer Session website regularly for updates to this course listing.

Changelog:
04/23/2024: 85-102 has been cancelled.