



EPGY Online High School Course Catalog 2009-10

PREFACE

The Education for Gifted Youth (EPGY) Online High School (OHS) Course Catalog is a complete listing of all courses offered through our school for the 2009-10 academic year. The courses are organized into three divisions: Humanities, Natural Sciences, and Social Sciences. Within each division they are further grouped by department. Additionally, a range of summer programs is available.

Standing apart from this division structure is our Core sequence of philosophy courses. All students pursuing the EPGY OHS diploma take this sequence of year-long seminar-style courses during their final four years of high school. The Core courses provide a common intellectual framework for students regardless of academic focus or outside interests. In Core courses, students engage in critical reading, intensive writing, and philosophical discussion aimed at fostering the ability to analyze arguments and state positions clearly and forcefully. Throughout the Core sequence, students discuss themes that reflect the overall mission of the EPGY OHS and that recur in other EPGY OHS courses.

EPGY OHS courses are conducted in two different styles. “Seminar” courses involve regular discussion sections (usually meeting twice weekly) and have a fixed schedule throughout the academic year. “Directed Study” courses are self-paced and provide the most scheduling flexibility. “Directed Study with Discussion” courses combine the support of regular discussion sections with the flexibility of the directed-study pacing for students wishing to accelerate.

Any course code beginning with a “U” indicates the course is at the university level. These are courses that have been deemed the equivalent of courses offered to undergraduates at Stanford University. Students enrolling in one of these courses will earn university credits through the Continuing Studies Program of Stanford University, and the course will also appear as part of the high school record on the EPGY OHS transcript. There is a listing of all university level courses at the end of this document.

CORE SEQUENCE

OMSB9 Core: Methodology of Science - Biology (Seminar: 10 units)

The 9th Grade Core course provides students with exposure to scientific content and methods of scientific reasoning and argumentation in the context of Biology.

OHSC1 History of Science: Great Ideas and Observations (Seminar: 5 units, Fall Only)

OHSC2 History of Science: Great Ideas and Experiments (Seminar: 5 units, Spring Only)

This two-semester course sequence examines the great ideas and great observations and experiments that have shaped the development of science. Using a case study method, students examine the interplay between observations of the physical world, attempts to explain those observations, and the methods used to test the resulting explanations. As part of the methodology of the inquiry, students learn and practice the skills of philosophical analysis, logical argument, and criticism.

Readings include Aristotle, Zhang Heng, Ptolemy, Abu Yusef al Kindi, Galileo, Kepler, Huygens, and Newton.

ODFRL Democracy, Freedom, and the Rule of Law (Seminar: 10 units)

This year-long course examines the foundations of civil society. Drawing on both historical and theoretical materials, the students study changing conceptions of how a state is and should be organized. In particular, we focus on different treatments of the interwoven concepts of democracy, freedom, and the rule of law. As part of their study, students practice the methodological tools of analysis relevant to philosophy and political theory, learn to formulate and evaluate hypotheses about the content of critical concepts, and develop a thorough knowledge of their political traditions and principles. These lessons contribute to the broader aim of the course, which is to prepare students for citizenship in their community by refining their ability to participate constructively in the discourse that draws on these conceptions of the state. While the course is organized around principles of American government, the readings are germane to democratic society generally.

Readings include Hobbes, Locke, Rousseau, Montesquieu, Madison, Jefferson, American founding texts, Lincoln, Addams, King, Burke, Tocqueville, Smith, Dewey, Mill, Berlin, Rawls, Nozick, Sandel, Sen, McMillan, Marx, Dicey, and Hayek.

OCRA1 Critical Reading and Argumentation (Seminar: 10 units)

In addition to the unique problems and questions that constitute its subject matter, philosophy makes notable use of a variety of intellectual tools and argumentative strategies that are widely applicable to both academic and informal inquiry. This course helps students develop these resources through a careful analysis of exemplary pieces of philosophical argument. To this end, we draw on philosophical thinking about scientific and religious concepts and modes of reasoning as well as Core philosophical discussions of the nature and limits of knowledge, the nature and content of ethics, and the mind's relation to the world. While the course emphasizes the cultivation of the tools and strategies of reading and argument, the materials encourage

reflection on some of the more abstract characteristics and assumptions of arguments in the disciplines of science, religion, and philosophy itself.

Readings include Sandel, Gould, Wright, Hume, Goodman, Carnap, Hempel, Popper, Kuhn, Descartes, Searle, Nagel, Jackson, Anselm, Aquinas, James, Kierkegaard, Plato, Frege, Russell, Aristotle, Kant, Mackie, Nietzsche, Sartre, and Foucault.

HUMANITIES

ENGLISH

OE007 – Grammar, Style, and Expository Writing (*Seminar: 10 units*)

Currently in development

OE008 – Expository Writing (*Seminar: 10 units*)

Currently in development; *Requirement*: Must be concurrently enrolled in OH008 – Honors History and Literature through the Ages.

OE010 Honors English: Textual Analysis and Argumentation (*Seminar: 10 units*)

Textual Analysis and Argumentation is the first writing course in the EPGY OHS sequence. It is designed as a survey of textual styles and writing techniques. Reading centers on short fiction, poetry, and short essays. The course works toward longer readings and more in-depth inquiries of drama (Arthur Miller's *The Crucible*), creative nonfiction (Houston and Houston's *Farewell to Manzanar*), and argumentative nonfiction/essay (Levitt and Dubner's *Freakonomics*). The introduction of literary reading techniques leads to analyses of literature, from short response questions to longer, more detailed investigations of theme and character. Students use increasingly sophisticated analytical techniques and rhetorical structures in addressing such topics as point of view, symbolism, conflict, figurative language, and allusion. This course, in particular the introduction of various rhetorical structures and techniques, provides the foundation for a study of rhetoric and rhetorical analysis.

OE011 Honors English: Modes of Writing and Argumentation (*Seminar: 10 units*)

Modes of Writing and Argumentation is a composition course in which students are introduced to traditional and contemporary terms of literary study. The fall semester concentrates on traditional terms of literary study and rhetorical strategies while building students' knowledge of narrative theory and the basis of metaphor in language. One major literary study (on the author Frederick Douglass) is written and closely re-written to establish criteria for how one performs such a study well. In the spring semester, students put their skills into action when our attention turns to more contemporary terms of textual study. Literary analysis includes two studies of Shakespearean plays, *Julius Caesar* and *Hamlet*, and a final essay on the modern play *Rosencrantz and Guildenstern are Dead* by Tom Stoppard. By year's end, students attain the skills and knowledge necessary for writing a five-page literary analysis, a common length study

in college literature courses. *Prerequisite: OE010 Textual Analysis and Argumentation or consent of instructor*

OE020 AP English Language and Composition: Rhetorical Analysis and Advanced Argumentation (*Seminar: 10 units*)

AP English Language and Composition is a seminar course designed to explore the analysis and writing of a variety of rhetorical modes of discourse—summary, description, process, compare and contrast, definition, causal analysis, and argumentation. Other concepts covered include figurative language, tone, critical reading, prewriting tactics, subject refinement and thesis development, diction and clarity, paragraph unity, revision, ethos, pathos, and logos, visual rhetoric, research, and the Toulmin structure of argument. This course moves beyond the formulaic essay styles and teaches students how to write extended pieces in which their ideas and their rhetorical goals guide the organization of their writing. *Prerequisite: OE011 Modes of Writing and Argumentation or consent of instructor*

OE021 AP English Literature and Composition: Ways and Means of Reading and Writing Across Literature (*Seminar: 10 units*)

This course surveys works of literature written in English from 1600 to the present. To make such a survey possible, the course focuses on literature from the “traditional axis” between England and the United States, though a crucial link to Caribbean literature is explored to create an understanding of contemporary Postcolonial perspectives. Works of literature to be studied include many novels, poems, a graphic novel, and other literary genres. Featured selections are drawn from the works of William Shakespeare, Zora Neale Hurston, Virginia Woolf, Walter Benjamin, Alice Walker, Herman Melville, Derek Walcott, Paul Auster, Emily Dickinson, and Laurence Sterne. At year’s end, students collect their writings on literature into a portfolio that narrates how they view the study of literature after many months of exploration. This portfolio also includes an essay portion where students formulate their general position on literary issues as it appears across their collected work. The extra-literary objective of the course is to enable students to enjoy reading in and writing about a variety of literature from a diversity of critical frameworks, e.g., historical, formal, theoretical, or biographical. *Prerequisite: OE020 AP English Language and Composition or consent of instructor*

OEG20 Grammar and Style of the Sentence (*Directed study: 5 units*)

Grammar and Style of the Sentence is a one-semester, self-paced course in which students learn to understand the grammar of the sentence and to make stylistic choices informed by their knowledge of grammar. The course includes no regular class meetings; the instructor holds weekly office hours in the virtual classroom and is available by phone or email. This course is beneficial for writers at all levels.

UE030 – Making Moby Dick (*Seminar: 5 units, fall only*)

This course examines the original context in which Herman Melville wrote his novel and then moves on to investigate critical and literary revisions to Melville’s text. In this sense, the challenge of the course is to see how a novel is invented and re-invented for a variety of purposes. Students gain perspective on theoretical and critical trends in the 19th century and the 20th century. *Prerequisite: consent of the instructor*

UE031 – Genre Crisis (*Seminar: 5 units, spring only*)

How is a novel poetic? How might poetry usurp the narrative strategies of the novel? Why does poetry do so? What do these questions, questions like them, and the answers to them reveal about the culture and history of the 20th century? This course surveys 20th century literature with an eye on “cosmopolitanism” or what we now tend to call “globalism.” The primary vehicle of study will be novels and poetry of this century and how authors adapt, utilize, and steal from any genre to achieve their literary and social ends. Students gain perspective on “genre” as social argument within the form of a single work of literature and as a cultural framework for making representative “books” in national and global settings. *Prerequisite: consent of the instructor*

FOREIGN LANGUAGE

OCH1A - Chinese I – Part A (*5 units – note: this is a year-long class*)

OCH1B - Chinese I – Part B (*5 units – note: this is a year-long class*)

These two courses taken together over a two-year period cover the same material covered in Chinese I (OCH01) during one academic year. Students acquire speaking and listening skills and a strong vocabulary. They learn several hundred basic characters enabling them to read and write sentences, dialogues, and short paragraphs. Aspects of Chinese culture and history are introduced. After successful completion of OCH1B, students will be ready to move into Chinese II (OCH02).

OCH01 Chinese I (*Seminar: 10 units*)

First-year Mandarin Chinese is designed for students who have no previous experience with Chinese language. The emphasis of the first year is on acquiring speaking and listening skills and a strong vocabulary. Students learn several hundred basic characters and read and write sentences, dialogues, and short paragraphs. Aspects of Chinese culture and history are introduced.

OCH02 Chinese II (*Seminar: 10 units*)

Second-year Mandarin Chinese introduces a greater variety of vocabulary, more complex sentence structures, and continues to apply these across the basic four skill areas: listening, speaking, reading, and writing. Emphasis is on practical situations while also including some readings based on traditional Chinese stories. Students should recognize about 1000-1200 characters by the end of the second year. *Prerequisite: Chinese I or equivalent*

OCH03 AP Chinese (*Seminar: 10 units*)

Third-year Mandarin Chinese continues to introduce vocabulary and characters and sharpens students’ use of words and sentence structures in both oral and written communications. Readings, discussions, and compositions based on everyday situations, current issues, and stories. Roughly 1600-1800 characters are introduced by the end of the third year. Students who take this course are well prepared for the Chinese AP exam. *Prerequisite: Chinese II or equivalent*

OLA1A - Latin I – Part A (5 units – note: this is a year-long class)

OLA1B - Latin I – Part B (5 units – note: this is a year-long class)

These two courses taken together over a two-year period cover the same material covered in the Latin I course during one academic year. By the end of Latin I, Part I, students complete the first fifteen chapters of *Wheelock's Latin*. By the end of Latin I, Part II, students complete another fifteen chapters of *Wheelock's Latin* while working more closely on translation of Latin prose. Students also study Roman history, mythology, culture, and daily life. After successful completion of OLA1B, students are ready to move into Latin II (OLA02).

OLA01 Latin I (Seminar: 10 units)

In this accelerated introductory course, students use *Wheelock's Latin* to master the basics of Latin grammar and vocabulary. By the end of the fall semester students complete the first fifteen chapters of *Wheelock*. By the end of the spring semester students complete another fifteen chapters of *Wheelock*, while working more closely on translation of Latin prose. Students also study Roman history, mythology, culture, and daily life.

OLA02 Latin II (Seminar: 10 units)

In this Intermediate Latin course, students finish *Wheelock's Latin* in the fall semester and then focus on the translation of Latin prose authors such as Cicero, Caesar, and Seneca in the spring semester. Students continue to study Roman history and culture with a particular emphasis on Latin literature. *Prerequisite: Latin I or equivalent*

OLA03 AP Latin Vergil (Seminar: 10 units)

In this final year, students prepare for the Latin AP exam on Vergil's *Aeneid*. The course includes large amounts of translation as well as close readings of the text, its themes and historical contexts. Students refine their mastery of Latin grammar as well as their critical thinking skills and essay writing. Students who take this course are well prepared for the Latin AP exam. *Prerequisite: Latin II or equivalent*

FINE ARTS

OU001 Introduction to Music Theory (Directed study: 5 units)

This is a first course in music theory. Topics: fundamentals of music, including notation, rhythm, meter, scales, intervals, and basic chord structure. *Prerequisite: Students must be able to read music in at least one clef. Knowledge of the keyboard is desirable but not mandatory*

OMT01 AP Music Theory (Directed study: 10 units)

AP Music Theory offers advanced music students as well as students with limited musical knowledge a way to further develop their abilities and strengthen their skills in various musical domains. The course covers topics ranging from the basics of notation and the elements of music through melodic structures, harmony—both functional and theoretical—and musical form. The majority of the course is computer graded so students can move at their individual paces and

focus on concepts where their current knowledge needs further strengthening. Class colloquiums are given weekly. Through musical listening in these sessions, the students collaboratively develop a way to discuss the technical and the social aspects of musical works. The course requires no previous musical knowledge.

NATURAL SCIENCES

MATHEMATICS

OM011 Honors Beginning Algebra (*Directed study with discussion: 10 units*)

For students who previously have had little or no formal exposure to algebra. Primary topics include: the elementary structure and language of real numbers, understanding and manipulating algebraic expressions including polynomials and rational expressions, solving linear and second-degree equations, understanding inequalities and systems of equations. Emphasis is placed on word problems and graphing.

OM012 Honors Intermediate Algebra (*Directed study with discussion: 10 units*)

For students with previous exposure to algebra but not sufficient mastery for OM013 Precalculus with Trigonometry. This course reviews and extends the topics of beginning algebra: linear equations and inequalities, absolute value, quadratic inequalities, roots and exponents, and systems of equations. *Prerequisite: OM011: Honors Beginning Algebra*

OM015 Honors Geometry (*Directed study with discussion: 10 units*)

This course combines the traditional deductive approach to geometry in the tradition of Euclid with the contemporary computational and discovery approaches. Primary topics include: logic, congruence of polygons, inequalities, similarity, properties of circles, area of plane figures, surface area and volume of solids, basic trigonometry, coordinate geometry, and transformational geometry. *Prerequisites: OM011 Beginning Algebra required; OM012 Intermediate Algebra strongly recommended*

OM013 Honors Precalculus with Trigonometry (*Directed study with discussion: 10 units*)

For students who have had substantial previous exposure to algebra. The course builds on and deepens all the topics from OM011 Beginning Algebra and OM012 Intermediate Algebra. Functions are studied, in particular, their composition and inverses. Other topics include: the algebra of exponential and logarithmic functions, techniques of graphing and matrices, mathematical induction, sequences and series, and analytic geometry. Approximately one third of the course focuses on trigonometry and its applications. *Prerequisite: OM012 Intermediate Algebra*

OM040 AP Calculus A (*Directed study with discussion: 5 units*)

An introduction to the differential calculus. Topics: limits and continuity, derivatives and differentiability, applications of the derivative, curve sketching, related rates, and implicit differentiation. *Prerequisite: OM013 Honors Precalculus with Trigonometry*

OM041 AP Calculus B (*Directed study with discussion: 5 units*)

An introduction to the integral calculus. Topics: parametric equations, Riemann sums, indefinite and definite integrals, techniques of integration and applications of the integral. Calculus A and Calculus B together prepare students to take the Calculus AB AP exam. *Prerequisite: OM040 AP Calculus A*

OM042 AP Calculus C (*Directed study with discussion: 5 units*)

Further study of differential and integral calculus. Topics: a more rigorous development of limits and derivatives, advanced techniques and applications of integration, power series, calculus for parametric equations and polar coordinates, simple differential equations. Together with Calculus A and Calculus B, this course prepares students to take the Calculus BC AP exam. *Prerequisite: OM041 AP Calculus B*

UM51A Linear Algebra (*Directed study: 7.5 units*)

An introductory course in linear algebra. Topics: linear spaces, transformations, matrices, eigenvalues, eigenvectors, and linear operators. *Prerequisite: UM52A Multivariable Differential Calculus and consent of the instructor*

UM52A Multivariable Differential Calculus (*Directed study: 7.5 units*)

Differential calculus for functions of two or more variables. Topics: vectors and vector-valued functions in 2-space and 3-space, tangent and normal vectors, curvature, functions of two or more variables, partial derivatives and differentiability, directional derivatives and gradients, maxima and minima, optimization using Lagrange multipliers. *Prerequisite: OM042 Calculus BC with AP sCore 4 or 5 and consent of the instructor*

UM52B Multivariable Integral Calculus (*Directed study: 7.5 units*)

Integral calculus for functions of two or more variables. Topics: double and triple integrals, change of variables and the Jacobian, vector fields, line integrals, independence of path and the fundamental theorem of line integrals, Green's theorem, divergence theorem, and Stokes' theorem. *Prerequisite: UM52A Multivariable Differential Calculus and consent of the instructor*

UM53A Differential Equations (*Directed study: 7.5 units*)

Basic techniques and methods for solving ordinary differential equations. Topics: linear, separable, and exact equations, existence and uniqueness theorems, difference equations, basic theory of higher order equations, variation of parameters, undetermined coefficients, series solutions, Laplace transform, systems of equations. *Prerequisites: UM51A Linear Algebra and UM52A Multivariable Differential Calculus and consent of the instructor*

UM106 Complex Analysis (*Directed study: 7.5 units*)

Theory of differentiation and integration of complex functions. Topics: algebra of complex numbers, complex functions, multi-valued functions, exponentials, logarithms, analyticity, integrals, power series, Laurent series, residues, isolated singularities, poles and zeros. *Prerequisites: UM51A Linear Algebra and UM115 Real Analysis and consent of the instructor*

UM109 Modern Algebra (*Directed study: 7.5 units*)

Theory of abstract algebra, with particular emphasis on applications involving symmetry.

Topics: groups, rings, fields, matrix and crystallographic groups, and constructibility.

Prerequisites: UM51A Linear Algebra and UM52B Multivariable Integral Calculus and consent of the instructor

UM115 Real Analysis (*Directed study: 7.5 units*)

Theory of functions of a real variable. Topics: sequences, series, limits, continuity,

differentiation, integration, and basic point-set topology. *Prerequisite: UM52B Multivariable*

Integral Calculus and UM51A Linear Algebra and consent of the instructor

UM131 Partial Differential Equations (*Directed study: 7.5 units*)

Theory of differential equations involving functions of more than one variable. Topics: first order equations, classification of second order equations, initial-boundary value problems for heat equation, wave and related equations, separation of variables, eigenvalue problems, Fourier series, existence and uniqueness questions. *Prerequisites: UM52B Multivariable Integral Calculus, UM53A Differential Equations, UM106 Complex Analysis and consent of the instructor*

UM152 Number Theory (*Directed study: 7.5 units*)

Introduction to number theory and its applications. Topics: Euclid's algorithm, divisibility, prime numbers, congruence of numbers, theorems of Fermat, Euler, Wilson, Lagrange; residues of

power, quadratic residues, introduction to binary quadratic forms. *Prerequisite: OM013*

Precalculus with Trigonometry and consent of the instructor

UM157 Introduction to Logic (*Directed study: 7.5 units*)

A standard introduction to sentential and first-order logic. Topics: semantics and syntax of sentential logic, truth tables, inference rules, proofs, counterexamples, quantification,

symbolizing English sentences, consistency proofs and independence. *Prerequisite: OM013*

Precalculus with Trigonometry and consent of the instructor

LABORATORY SCIENCE

OP007 – Inquiry-based Physics (*10 units*)

Currently in development

OPL07 – Inquiry-based Physics Lab (*2 units*)

Currently in development

OC005 Honors Chemistry (*Seminar: 10 units*)

Honors Chemistry is a year-long seminar course that introduces students to the fundamental concepts in the large discipline of chemistry. This advanced high school chemistry course covers key chemistry topics, including: chemical nomenclature, stoichiometry, the periodic table, chemical bonding, equilibrium, kinetics, thermodynamics, nuclear chemistry, and common

laboratory practices. Its purpose is to give students a solid foundation in chemistry in preparation for AP Biology and college-level chemistry courses.

OC010 AP Chemistry (*Seminar: 10 units*)

AP Chemistry is a year-long seminar course that covers college-level introductory chemistry topics and serves as an introduction to organic and biochemistry. Emphasis is placed on understanding concepts through visual models, problem-solving, and classroom discussions. The aim is to prepare students for advanced, college-level chemistry courses through mastery of fundamental concepts and to help them gain an appreciation of chemistry in everyday life and industry. Regular homework and classroom assignments support the goals of this course: conceptual understanding of chemistry through problem-solving in the context of the real world. Virtual labs expose students to the art of performing experiments in the laboratory setting, reinforce key concepts, and help develop tools for critical evaluation of methods and data.
Prerequisite: passing sCore on AP Chemistry pretest

OCL05 Honors Chemistry Lab (*Listed in “Summer Programs”*)

OCL10 AP Chemistry Lab (*Listed in “Summer Programs”*)

OB010 AP Biology (*Seminar: 10 units*)

AP Biology is a year-long seminar course that covers college-level introductory biology topics in molecular and cellular biology—*anatomy, physiology, and diversity of plants, animals, and microbes—and ecology and evolution.* Emphasis is placed on the themes that unify biology, including regulation of biological processes, energy transfer, continuity and change, evolution, the relationship between structure and function, emergent properties, interdependence in nature, the scientific process, and the relevance of biology in our everyday lives. Through at-home and virtual lab work, students learn useful biological techniques, gain the ability to design scientific experiments, effectively communicate results, and strengthen their knowledge of material presented in lecture. *Prerequisite: OC005 Honors Chemistry, OC010 AP Chemistry, or consent of instructor*

OBL10 AP Biology Lab (*Listed in “Summer Programs”*)

OB001 Health (*Directed study: 5 nonacademic units*)

The EPGY OHS Health and Wellness course is a self-paced course for students without a previous health class or AP Biology at EPGY OHS. In this course, students gain the knowledge and skills necessary to maintain a long and healthy life by identifying and avoiding dangerous environments and risky behavior and by preventing common communicable and chronic diseases. Students also gain an appreciation for how the body and mind work and learn about the changes to be expected in the future. Finally, students learn about the role individuals play in public health and maintaining the health of a community. Using the course workbook as a guide, the course can be completed in less than a semester.

OP10A, OP10B, OP10C AP Physics B (*Directed study with discussion: 10 units total*)

This sequence of three courses gives students a firm understanding of the principles and concepts of physics. Topics: mechanics, wave motion, sound, thermodynamics, electricity and magnetism,

optics, relativity, and some highlights of modern physics. The sequence prepares students to take the Physics B AP Exam. *Prerequisite: completion of OM011 Honors Beginning Algebra or equivalent*

OP051 AP Physics C: Mechanics (*Directed study with discussion: 5 units*)

An introductory, calculus-based course in mechanics. Topics: kinematics, vectors, Newton's laws, work and energy principles, rotational dynamics, gravitation, and simple harmonic motion. Prepares students to take the Physics C: Mechanics AP exam. *Co-requisite OM040 AP Calculus A or equivalent*

OP053 AP Physics C: Electricity and Magnetism (*Directed study with discussion: 5 units*)

An introductory, calculus-based course in electricity and magnetism. Topics: electric fields and potentials, circuits, magnetism, magnetic induction, and AC circuits. Prepares students to take the Physics C: Electricity and Magnetism AP Exam. *Prerequisite OM041 AP Calculus B or equivalent*

OPL50 AP Physics Lab (*Listed in "Summer Programs"*)

UP055 Light and Heat (*Directed study: 7.5 units*)

An introduction to optics and thermodynamics. Topics: temperature, properties of matter, introduction to the kinetic theory of matter, light and electromagnetic waves, reflection and refraction of light, lens systems, interference, and diffraction. *Prerequisite: OP053 AP Physics C: Electricity and Magnetism and consent of the instructor*

UP070 Modern Physics (*Directed study: 7.5 units*)

An introduction to the ideas of modern physics. Topics: key concepts in special and general relativity, quantum mechanics, nuclear physics, high-energy particle physics, and cosmology. *Prerequisite: UP055 Light and Heat and consent of the instructor*

UP110, UP111 Intermediate Mechanics I & II (*Directed study: 7.5 units each*)

A thorough exploration of the mechanics of systems of particles and rigid bodies. Topics: coordinate transformation and vectors, Newtonian mechanics, linear and nonlinear oscillations, Hamilton's principle, Lagrangian and Hamiltonian dynamics, non-inertial reference systems, rigid-body dynamics, coupled oscillations, and introductory fluid mechanics. *Prerequisites UP070 Modern Physics and UM53A Differential Equations or equivalent and consent of the instructor*

UP120, UP121 Intermediate Electricity and Magnetism I & II (*Directed study: 7.5 units each*)

An exploration of electricity and magnetism. Topics: vector analysis, electrostatic fields, including multipole expansions, dielectrics, special relativity, and transformation between electric and magnetic fields, Maxwell's equations, static magnetic fields, magnetic materials, electromagnetic radiation, and plane wave problems. *Prerequisite UP111 Intermediate Mechanics II and consent of the instructor*

UP130 Introduction to Quantum Mechanics (*Directed study: 7.5 units*)

A sophisticated introduction to quantum theory. Topics: origins of quantum mechanics, wave mechanics, and the Schrodinger equation, Heisenberg's matrix formulation of quantum mechanics, solutions to one-dimensional systems, separation of variables and the solution to three-dimensional systems, the central field problem and angular momentum, eigenstates, spin and the coupling of angular momentum, invariance principles, and the conservation laws in the context of quantum theory. *Prerequisites* UP111 *Intermediate Mechanics II* and *consent of the instructor*

COMPUTER SCIENCE

OC11A Introduction to C Programming (*Directed study with discussion: 3.33 units*)

The first course in this series introduces the fundamentals of C Programming including basic syntax, data types, expressions, control statements, and interaction between the compiler and the hardware. The programming exercises are oriented towards learning how to construct an efficient algorithm to solve a problem and include computing the solutions of quadratic equations, finding prime or perfect numbers in a given range, and processing words in a passage of text.

OC11B Programming in C: Algorithms and Techniques (*Directed study with discussion: 3.33 units*)

The second course in the C Programming series introduces advanced topics including arrays, functions, passing arrays to functions, sorting algorithms, user-defined types, and recursion. The programming exercises are oriented towards learning top-down design and structured programming. At the end of the course there is a final project that involves implementation of everything learned in the course. *Prerequisite: OC11A Introduction to C Programming*

OC11C Compound Data Types and Advanced Topics in C (*Directed study with discussion: 3.34 units*)

The third course in C Programming introduces pointers, application of pointers to function arguments and arrays, files, linked list, and trees. The course focuses on implementing data structures—the key organizing factor to formalize design methods and programming languages. *Prerequisite: OC11B Programming in C: Algorithms and Techniques*

OC015 Introduction to Java (*Directed study with discussion: 5 units*)

This course introduces students to the concept of object-oriented programming. Topics: basic and advanced features of Java as well as object-oriented design, designing and building applications such as web applets. *Prerequisite: a course in C or C++ or consent of instructor*

OCS01 AP Computer Science (*Seminar: 10 units*)

Students explore Core topics in the context of the Java programming language. Topics include: object-oriented programming, fundamental data structures (such as lists, queues, stacks, trees, and heaps) and algorithms (especially those for sorting and searching). The relationship between

computer hardware and a compiled program is studied. Much of the course is project-based, with assignments stressing the design of classes and algorithms appropriate to a problem. This course prepares students to take the AB-level Computer Science AP exam. *Prerequisite: OC015 or consent of instructor*

SOCIAL SCIENCES

HISTORY

OH007 - Honors US History and Geography (10 units)

Currently in development

OH008 - Honors History and Literature through the Ages (10 units)

Currently in development; *Requirement:* Must be concurrently enrolled in OE008 – Expository Writing.

OH010 AP World History (Seminar: 10 units)

The AP World History course introduces students to human history, emphasizing the period from about 8,000 B.C.E. to the present. The course explores the economic, social, and political life of the world's peoples with a focus on three themes: technology and the environment; diversity and dominance; and interactions and networks. Students broaden and deepen their knowledge of world history, analyze sources and historical accounts, and answer historical questions. Course materials include a textbook, interpretative essays, and primary sources. Student achievement is evaluated on the basis of quizzes, a notebook, participation in discussions, analytical exercises, examinations, and papers. The course helps students arrive at a better understanding of today's world based on their knowledge of the past. *Co-requisite: OE010 or consent of the instructor*

OH011 AP United States History (Seminar: 10 units)

The AP US History course introduces students to American history, covering the period from the seventeenth century to the present. The course focuses on political life in America with an emphasis on three main influences on its development: the structure of society, ideas of freedom, and external relations. The lectures highlight the specificity of the American experience by situating national developments in a global context. Students broaden and deepen their knowledge of United States history, analyze primary sources and historical accounts, and create their own interpretations. Course materials include a textbook, interpretative essays, and primary sources (documents, images, sound recordings and film). Student work is evaluated on the basis of a notebook, participation in discussion sections, analytical exercises, examinations, and papers. The course helps students arrive at a better understanding of today's United States based on knowledge of the past. *Prerequisite: OE010 or consent of the instructor*

OH030 International and Global History I (Seminar: 5 units, may be repeated once for credit)

This advanced course introduces students to selected problems in recent international and global history. Each year the course focuses on a different problem, such as the evolution of the interstate system; the emergence of a global economy; political revolution and stabilization;

conflict and peacemaking; nationalism and ethnic identity; and migration and diasporas. The course is taught as a tutorial with few, if any, formal lectures. Historical methods employed in the empirical analysis of international and global issues are covered, and students are required to prepare short written essays to present in class. The course typically begins with a small number of general texts that establish a framework for analysis before turning to particular events or developments. Students may take this course alone or as part of a year-long sequence.

Prerequisite: consent of instructor

OH031 International and Global History II (*Seminar: 5 units, may be repeated once for credit*)

Continuation of OH30 International and Global History I. Students who desire to prepare a research paper in history or social sciences may elect to do so, typically completing the bulk of the writing during the spring semester. *Prerequisite: OH030 International and Global History I and consent of instructor*

ECONOMICS

UEC20 Economics (*Seminar: 10 units*)

This university-level Economics course (currently under review for approval by Stanford University) focuses on fundamental microeconomics concepts at an early undergraduate level. The course is divided into three sections. Section one focuses on the consumer by first introducing the concepts of utility functions, indifference curves, and firm supply then culminates in the study of market equilibrium and price determination. Standard issues such as taxation, consumer and producer surplus, and Slutsky and Hicksian decompositions are covered. The second section focuses on the producer, introducing the concepts of production function, profit maximization, and the dual problem of cost minimization, factor demand functions, cost curves, competitive market price setting, and monopolistic markets. The third section focuses on the following advanced microeconomic topics: net present value; basic game theory and the prisoner's dilemma; elements of general equilibrium theory, including the Edgeworth box, Pareto efficiency, and elements of welfare theory; and market failures, including externalities and public goods. *Prerequisite: concurrent enrollment in calculus and consent of the instructor*

SUMMER PROGRAMS

OCL05 Honors Chemistry Lab (*Summer session at Stanford: 2 units*)

Wet labs conducted at Stanford facilities complement the virtual labs during the school year.

OCL10 AP Chemistry Lab (*Summer session at Stanford: 2 units*)

Wet labs conducted at Stanford facilities fulfill the AP lab component and complement the virtual labs during the school year.

OBL10 AP Biology Lab (*Summer session at Stanford: 2 units*)

AP Biology Lab is a three-week-long residential summer course held on the Stanford campus that allows students to explore college-level introductory biology topics through hands-on experimentation. Topics include molecular and cellular biology; physiology of plants, animals, and microbes; and ecology and evolution. Emphasis is placed on understanding the process of science, experimental design and interpretation, and the relevance of biology to our everyday lives. Students gain experience with modern biological techniques currently used in molecular biology and medical diagnostic labs, as well as learning to effectively record and communicate results. This course is designed to be taken after completion of the AP Biology year-long course.

OPL50 AP Physics Lab (*Summer session at Stanford: 2 units*)

Labs conducted at Stanford facilities fulfill the AP lab component for AP Physics B and AP Physics C.

OH020 and OH021 Research Methods I and II (*Summer seminar at Stanford: 2 units each*)

These courses introduce students to the research process, offering them an opportunity to master skills they need to pursue rigorous study in the humanities and social sciences. This intensive program combines presentations on methodology; lectures on a particular theme; participation in small research groups (7 to 10 members) led by qualified researchers; and individual tutorials in which students receive comments and suggestions on their work. Students complete an original research project based on sources available in the Stanford University Libraries and the Hoover Institution's archives. They learn how to survey existing knowledge; formulate a research problem; design a research program; find, select, and exploit sources; analyze empirical findings; develop an argument; and deliver their results in effective multi-media presentations and well documented and closely reasoned reports.

OL001, OL002, and OL003 Leadership Seminar I, II, and III (*Summer seminar at Stanford: 1 unit each*)

In this two-week seminar style course, students review selected readings and engage in lively class discussion to explore the complexities and multiple dimensions of leadership. At the beginning of the course students are asked to look inward into their own personal leadership style and the pivotal importance of self-leadership. As the course progresses students begin to look outward, considering the deeper needs that people have and how leaders can tap into these to create highly effective teams. The class discusses the importance of verbal and non-verbal aspects of communication that leaders need to master in order to manage effectively. Silicon

Valley business leaders, entrepreneurs, and inventors participate as guest speakers who share their views on leading a company in the new global economy.

OEW20 Writing Styles (*Summer seminar at Stanford: 1 unit*)

Students are introduced to four distinct writing styles: Journalism, Creative Writing, Speech Writing, and Science Writing. Through lecture and analysis of writing samples, students learn the main differences among the styles. Guest lecturers with expertise in each style are invited to meet with students. Students write in two of these styles, and the experts critique and analyze their work.

UNIVERSITY-LEVEL COURSE INDEX

***UE030 – Making Moby Dick**

***UE031 – Genre Crisis**

***UEC20 Economics**

UM51A Linear Algebra

UM52A Multivariable Differential Calculus

UM52B Multivariable Integral Calculus

UM53A Differential Equations

UM106 Complex Analysis

UM109 Modern Algebra

UM115 Real Analysis

UM131 Partial Differential Equations

UM152 Number Theory

UM157 Introduction to Logic

UP055 Light and Heat

UP070 Modern Physics

UP110, UP111 Intermediate Mechanics I & II

UP120, UP121 Intermediate Electricity and Magnetism I & II

UP130 Introduction to Quantum Mechanics

***In process for approval by Stanford University**