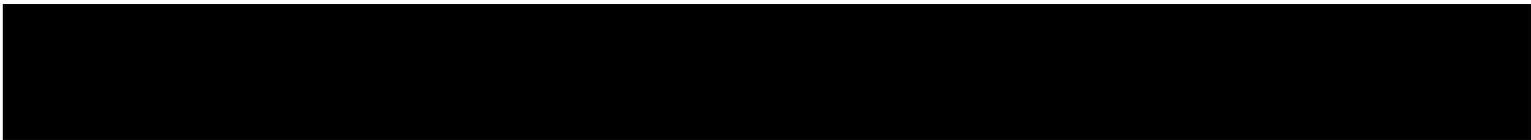


HARKER

2019-20

Upper School

Course of Study



Mission Statement

Our mission is to educate students for success at college and beyond, and to foster kindness, respect, and integrity within a safe and nurturing environment.

We achieve academic excellence through the development of intellectual curiosity, personal accountability and love of learning.

Our comprehensive program and exceptional faculty and staff help students discover, develop and enjoy their unique talents.

We honor individuality, embrace diversity, and promote leadership and service, preparing students to take their place as global citizens.

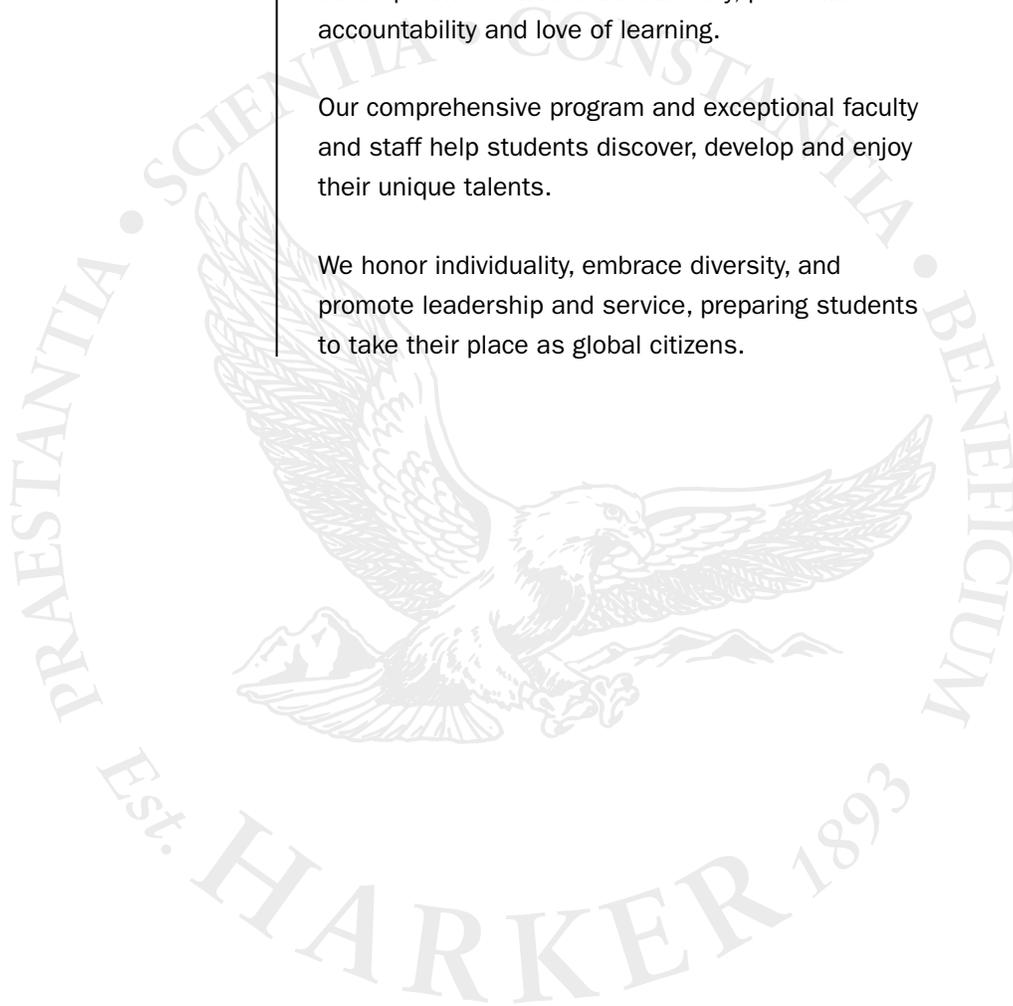


Table of Contents

General Academic Information	3
Course Descriptions	8
Business and Entrepreneurship	8
Computer Science	11
English	16
Global Online Academy	24
History and Social Science	25
Journalism	29
Mathematics	30
Modern and Classical Languages	34
Physical Education	45
Science	49
Speech and Debate	55
Visual and Performing Arts	56

The Harker School – Upper School Course of Study

General Academic Information – Curriculum

The curriculum at The Harker School is composed of a core of required courses which forms the basis of a strong liberal arts education. A broad array of elective offerings, particularly in the senior year, helps to meet the individual needs and interests of students. As a college preparatory school, Harker provides each student with a personal course of study which is challenging but which also offers extensive extracurricular opportunities. Many clubs, activities, sports and performance opportunities are available.

Developing a Curriculum Plan

Students are asked in the freshman year to develop, with the guidance of the academic dean, a four-year plan that satisfies the graduation requirements as well as their personal education goals. The purpose is to ensure that students will think through all elective choices carefully. This use of elective courses will help students explore areas of interest and possibly develop depth in those areas of study which most appeal to them. Careful planning helps students avoid being unable to take desired subjects because they have run out of time in their schedules. Advance planning also allows students to make sure they will be prepared for important college admissions exams such as the SAT Subject Tests. Students will make revisions to their plans in subsequent years, but it is important always to have a realistic plan that extends to graduation.

Graduation Requirements

To graduate from The Harker School students must:

- complete at least 22 academic credits which must include all required courses and credit totals within each department;
- complete at least two credits (four semesters or seasons) of physical education credit;
- complete the 30-hour community service requirement described in the student handbook; and
- abide by the behavior expectations described in the Honor Code and the Code of Conduct in the student and parent handbook available via the school website.

Academic credit will only be given for courses taken at Harker.

The Harker School – Upper School Course of Study

The Harker School – Academic Planning Chart with Graduation Requirements

The following chart will be used when the students meet with the academic dean to create the four-year plan. It graphically shows the requirements as well as the slots available for the required (shaded) and elective (not shaded) courses. Students must take a minimum of five academic classes (always including English) for each of their eight semesters and a maximum of six academic classes. The Extra Period Option courses are not included in this five/six class requirement, but students do earn a grade and one half credit for the year in most (but not all) of these courses. See the course description section for more details, including credit information, on the Extra Period Options which include music (Bel Canto, Downbeat, Cantilena, Camerata, Orchestra and Jazz Band), Dance (JV and Varsity), Journalism (Newspaper and Yearbook), Speech and Debate (Introductory, Intermediate and Competitive), and Business and Entrepreneurship (Principles, Business Leadership). There is no grade for P.E., but students may take a P.E. class during the school day in this Extra Period Option course slot.

		9th	10th	11th	12th	Requirements
1	English	English 1: Study of Literary Genres	English 2: British Lit.	English 3: American Lit.	English 4: 2 semester courses or AP English Lit.	4 years
2	Math					3 years 4 recommended
3	Science	Physics	Chemistry	Biology		3 years
4	History	World 1	World 2, AP World or AP European	United States		3 years
5	Language					Complete Level 3
6	Arts/ Computer Science	Study of Visual Arts, Music, Dance or Theater Arts				Arts - 1 year Comp. Sci. - 1 sem.
7	Extra Period Option					
	Total Credits (min)	6	5-6	5-6	5-6	22 credits minimum

The Harker School – Upper School Course of Study

English – 4 years/8 semesters

The first three years have a set curriculum. The senior year students take AP English Literature or choose two semester-long courses from a list with many options.

Mathematics – 3 years/6 semesters

Students must complete a minimum of three years of mathematics in the upper school and have completed the following courses: Algebra 1, Algebra 2/Trigonometry and Geometry. We strongly recommend that students take four years of mathematics.

Science – 3 years/6 semesters

The three years have a set curriculum and order – Physics, Chemistry and Biology.

History – 3 years/6 semesters

The first and third years are set with, respectively, World History 1 and U.S. History. The second year students choose between World History 2, AP World History or AP European History.

Foreign Language – completion of level 3

Students must pass a level 3 or higher course to satisfy this requirement, with at least one of those years completed at the upper school. This does not necessarily require three years of study in the upper school. While we encourage students to continue beyond level 3, and many do, it is not required.

Study of the Arts – 1 year

Students must take a yearlong course in the arts, generally in the freshman year. Students choose between Study of Visual Arts, Study of Theater Arts, Study of Music and Study of Dance. Students may instead take AP Art History in grades 10-12 if they qualify and are approved; most upperclassmen who enjoy this challenging course take it as an elective in addition to the Study of the Arts course as a freshman.

Computer Science – 1 semester

Students must complete one semester of computer science in a course that emphasizes algorithmic thinking. Most satisfy this requirement with Digital World, Programming or Advanced Programming, but students with significant prior in-class course work may test directly into AP Computer Science or APCS with Data Structures (both yearlong courses).

Electives – as necessary

Students choose electives as desired to ensure a minimum of five and a maximum of six academic courses at all times and a total of 22 credits by graduation.

Physical Education – 4 semesters (or sports seasons)

Though ungraded, students must complete four semester-long P.E. courses or participate in competitive after-school sports for four seasons. Students can take a P.E. class during the day (instead of having a free period), or students can sign up for an after-school P.E. class. At a minimum, one P.E. class or sports season should be completed each year.

Passing Requirements

Students must earn a D- or higher grade to pass and earn credit for a course. Semester grades between D- and D+, while considered passing for high school credit, do not meet many college requirements, including with the University of California and the California State University systems. Students earning a D-, D or D+ in a course required for UC or CalState admissions are encouraged to meet with the academic dean to discuss remediation. A remediated grade, through coursework completed outside of Harker, does not change the student's Harker transcript but can be used to meet college eligibility requirements.

The Harker School – Upper School Course of Study

Academic Policies and Procedures

Students are grouped to give each individual the pace of learning that is challenging but not stressful. Groups are not static. Placement is evaluated on an ongoing basis and can change if performance indicates that coursework is too demanding or insufficiently challenging.

Early in the fall, a student may be considered for a move from a regular to an honors section if the student is earning at least a 93% in every category that comprises the student's grade in the course. Along with the earned grades, approval from the department and the upper school head are critical components to such a move as a course load and schedule change of this kind should not be taken lightly. A student earning below a B (83%) at any time during a grading period jeopardizes his or her continued placement in an honors or AP section. The teacher will place the student on placement review. If the grade is not raised within this period, the student will be placed in a regular section.

A student who is doing well in a regular section but has not met the requirements to move up early in the fall will continue to thrive in the regular section through the school year. When courses for the following school year are selected at the beginning of the second semester, the student may request to take the next course at the higher level, either honors or sometimes Advanced Placement (AP). Earning a solid A in a regular course, along with earning department approval, is necessary to move up to an honors or AP course in that department for the following year.

Summer School Placement Policies

A student who takes a non-honors class during the summer session at Harker will not be moved to an honors section in the fall based on summer performance. Balancing the demands of multiple courses is an important part of the approval process for movement from a regular class to honors. Also, students who have been approved at the end of the year to take an honors course for the following school year will not be placed in the honors level during the summer; such placements will begin in the fall. Due to the fast-paced nature of the summer course, it is not in the student's best interest to begin the honors sequence in the summer.

Honors and Advanced Placement classes, PSAT/NMSQT, SAT and SAT Subject Tests, and the ACT

Because honors and AP classes are taught at a higher level than a regular class, both receive an additional 0.5 grade point added during the GPA calculation. The College Board has designated all AP courses as college level, so students can expect an AP course to be more challenging than the honors courses that preceded it. Similarly, honors advanced topics courses that follow an AP course are college-level courses that delve deep into a subject. When creating the four-year plan with the academic dean or modifying it in subsequent years, students (and parents) need to consider the cumulative work load for all the classes in any given year. Students who take an AP class at Harker must take the AP test in that subject in May of that school year. These three-hour, subject-specific tests are graded on a scale of 1 to 5, and depending on the test, the score and the university, students may receive credit towards their college graduation via their AP work.

Students take the PSAT/NMSQT (Preliminary Scholastic Assessment Test) for practice in the fall of the sophomore year. This test yields diagnostic information about a student's testing pattern. The score is not reported to the colleges. Students take the PSAT/NMSQT again in the fall of the junior year. This score is not reported to the colleges, but National Merit Recognition is based on this testing.

The Harker School – Upper School Course of Study

Traditionally, students take the SAT in the second semester of their junior year. The SAT is a three-part test that measures critical reading, mathematical reasoning and writing ability. Each portion of the test is scored on a scale of 200-800. If necessary, the SAT may be taken again in the fall of senior year. While once is the goal, taking the test twice is not uncommon. Students do not typically benefit from taking the SAT more than three times as scores do not vary significantly.

The SAT Subject Tests are one-hour single-subject tests which are scored on a 200-800 scale. Students should plan to take two SAT Subject Tests, and they should be taken immediately after a student has completed an affiliated course (such as Precalculus for the Math Level 2). Students may consult with their teachers, advisor and the academic dean to determine which SAT Subject Tests to take.

Some students may find that the ACT is better suited to their style of learning and testing. Most colleges will accept either the SAT or the ACT, so if a student feels his/her PSAT and then SAT scores do not reflect his/her ability, the ACT can be taken.

Course Descriptions

Course descriptions for every course, separated by department, are given on the following pages. Students are encouraged to read these descriptions prior to signing up for a course. Course and grade prerequisites, if applicable, are given. Most courses include a note that the course is “UC approved.” These are courses that seniors, when they are applying to the University of California schools, will be able to include on their UC applications. Some courses include the following note: “This course is an Extra Period Option course.” As discussed above, these courses do not count toward the five minimum / six maximum course requirement. Unless specified otherwise, semester classes earn one half credit and yearlong courses earn one full credit.

The Harker School – Upper School Course of Study



Business and Entrepreneurship

The business and entrepreneurship curriculum focuses on developing real-world business acumen, entrepreneurial readiness and innovative skills in students. In order to bolster the conventional high school curriculum, unique education such as business simulations, case studies, competitive opportunities and capstone projects will provide students with one-of-a-kind experiences. Students learn about marketing, finance, management and entrepreneurship through introductory business courses, attending the multiple business and entrepreneurial events held throughout the year, and by participating in the Harker DECA chapter. Students also have the opportunity to complete traditional introductory and advanced coursework in economics.

Course Descriptions

■ Principles of Business and Entrepreneurship (1 year/0.5 unit)

The unique characteristic of this course is that it is in a mini-MBA format consisting of four separate modules to be touched upon throughout the year: marketing, accounting & finance, entrepreneurship, and strategy & management. The focus of the course is to deliver a broad-stroke approach to the students, providing essential concepts and principles that are brought into action through a capstone project and competitive event that each module requires. Once these concepts have been mastered and applied for each module, we will delve deeper into each subject through the research and discussion of Harvard Case Studies. Students will apply their learning and live the mantra “learn by doing” as they simulate roles of CEO, consultant, CFO, etc., to bring solutions to complex and extraordinary issues that companies/entrepreneurs often face.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation.

Prerequisite: None

■ Business Leadership (1 year/Not for credit)

Appointed officers of The Harker School DECA chapter will utilize this course to prepare the chapter for competitive success, coordinate professional chapter events and conference logistics, and plan school and community outreach events. The group will be able to more fully collaborate in their leadership of the program and participate together in special opportunities for business professional and managerial preparedness.

Officers of the DECA program must enroll in this non-credit, extra period class. Because this is an Extra Period Option course, students may take this course in addition to their full academic loads.

■ Economics* (1 semester/0.5 unit)

This course is a survey course that will introduce students to the basic principles of economics, including both microeconomics and macroeconomics. Key topics include the fundamentals of economics, the theory of supply and demand, elasticity, price controls, market structures, the business cycle, monetary policy, and fiscal policy, among others. Additionally, students will be introduced to basic ideas surrounding personal finance. Students learn through reading, practice problems, simulations, videos and lecture.

Prerequisite: Sophomores, juniors and seniors may take Economics. UC approved.

■ Behavioral Economics* (1 semester/0.5 unit)

Behavioral Economics examines how psychological, social and cognitive factors impact decision-making. In traditional economic models, humans are considered to be perfectly rational - meaning that they make “perfect” decisions based on price. In practice, human behavior is more unpredictable, or “predictably irrational.” Behavioral economics studies how people respond to stimulus when they make decisions and why they respond that way.

Prerequisite: Completion of Economics or one semester of AP Economics. UC approved.

The Harker School – Upper School Course of Study

Business and Entrepreneurship, cont.

■ Honors Entrepreneurship: Startup Incubator I (1 year / 1.0 unit)

This 2-semester course will give you an authentic entrepreneurship experience where you will create and commercialize your own product or service. You will be led through the Lean Startup processes of developing hypotheses about a business concept, testing those hypotheses, adapting, and continually iterating. Once you have validated your business concept hypotheses, you will receive a seed grant to propel your business plan into reality, thereby learning business foundations in entrepreneurship, marketing, economics, finance and business operations firsthand. In addition to seed funding, you will be paired with San Francisco Bay Area entrepreneurs and business experts to help guide you through these processes. The business you will build in this course is real – they are not business cases or simulated experiences – which means you will experience mistakes, take risks, and learn to pivot based on market research. At the end of the course, you will have the opportunity to pitch a panel of angel investors and venture capitalists for follow-up funding.

Prerequisite: Enrollment in this course is open to all students in grades 11 and 12 (10th with department approval) who are interested in experiencing the journey of entrepreneurship. You do not need to have launched a business or even have a business concept in mind to enroll. To apply, students are required to submit an application outlining their interest in the course, what they hope to accomplish, and their qualifications.

Note: This is an honors-level academic course that may not be taken in the Extra Period Option slot.

■ Honors Entrepreneurship: Startup Incubator II (1 year / 1.0 unit)

This two-semester course is designed to help current business owners with scaling their companies as they develop and refine their marketing strategies to drive sales and fulfill customer orders. The course will challenge student business owners to think critically about the process of getting, growing and keeping customers. Emphasis will be placed on predicting, measuring, analyzing and concluding strategies

developed and applied to promote the above-mentioned process. Students will receive seed grants to help them through this process and they will have opportunities to pitch to investors for additional funding. San Francisco Bay Area entrepreneurs and business experts will serve as mentors, guiding you through these processes.

Prerequisite: Enrollment in this course is open to all students in grades 11 and 12 (10th with departmental approval). Only students who have launched a business and are currently selling their product/service are eligible to enroll. To apply, students are required to submit a business plan or pitch deck along with an application outlining their interest in the course, what they hope to accomplish, and their qualifications.

Note: This is an honors-level academic course that may not be taken in the Extra Period Option slot.

■ AP Economics (Micro and Macro) (1 year/1.0 unit)

This yearlong, college-level course, previously AP Microeconomics and AP Macroeconomics, begins with a focus on the principles of microeconomics as they pertain to individuals, businesses and organizations within the economic system. The course continues with a focus on the principles of macroeconomics that apply to the economic system as a whole. Students are prepared for the AP Microeconomics and AP Macroeconomics exams in the spring. AP Economics is open to juniors and seniors who are enrolled in Honors Precalculus or a more advanced honors math course or who have completed Economics and obtain teacher approval. AP Economics is open to sophomores who are concurrently enrolled or have already taken AP Calculus BC.

UC approved.

■ Honors Advanced Topics in Economics: Game Theory* (1 semester/0.5 unit)

Game Theory seeks to systematically explore the strategic interactions of humans in various contexts from international diplomatic relations to parents and children. Using models for understanding different players, their strategy options, and payouts, Game

The Harker School – Upper School Course of Study

Business and Entrepreneurship, cont.

Theory can be used to predict the outcome of these strategic interactions given the assumption of rational actors. Different game types include: one-time simultaneous games, repeated games, sequential games, mixed strategy games, threats, promises and the manipulation of games, and possibly the strategy of auctions, negotiations and voting.

Prerequisite: AP Economics. Seniors may request to take Game Theory concurrently with AP Macroeconomics in the spring. UC approved.



The Harker School – Upper School Course of Study



Computer Science

The growth of the computer and electronic industries has contributed to profound and fundamental changes in how we work, live, interact with others and play. We are surrounded with computers, both hidden and obvious, in all aspects of our lives. The computer science department offers a well-rounded program in technology and computer science, with courses that will appeal to the lay user as well as the computer science-bound student. All students must take at least one semester of computer science prior to graduation.

Course Descriptions

■ Digital World* (1 semester/0.5 unit)

This course provides an introduction to exciting applications and topics in computer science. Using a combination of in-class discussions, hands-on projects, forum discussions and guest speakers, students learn about digital representations, computational models and abstraction. The course is organized around the study of current topics in computer science. Although specific topics may vary, typical topics include computer architecture and networking, programming, ethical issues in computer science, gaming as a learning platform, and social media and privacy concerns.

Prerequisite: Algebra 1. UC approved.

■ Programming* (1 semester/0.5 unit)

This course helps entry-level computer science students develop their computational thinking skills by applying the basic steps in algorithmic problem-solving and abstraction. Students strategize and discuss solutions and then develop a program that embodies their solutions. Throughout the course, students increase their programming skills by analyzing complex problems and decomposing them into smaller more manageable problems, and by so doing, gain not only an appreciation of elegant solutions but also experience the thrill of obtaining them. Students explore virtual worlds with robots, and customize robots of their own design, while learning basic programming and algorithmic thinking skills. Students learn object-oriented programming skills such as creating classes, designing and implementing methods, and exploring inheritance. Students use arrays to store objects and then manipulate the objects within the data structure. Programming is designed to fulfill the prerequisite for

students who intend to pursue Advanced Placement Computer Science A.

Prerequisite: Geometry or Honors Geometry. UC approved.

■ Advanced Programming* (1 semester/0.5 unit)

This course helps students develop their computational thinking skills by applying the basic steps in algorithmic problem-solving and abstraction. Students strategize and discuss solutions and then develop programs that embody their solutions. Students learn to use object-oriented programming concepts such as creating classes, designing and implementing methods, and utilizing inheritance to break complex problems down into smaller, more manageable sub-problems. Students hone their skills to gain a thorough understanding of the technique of recursion. Students will store objects in data structures such as arrays and *ArrayLists* and then manipulate the objects within. Students not only gain an appreciation of elegant solutions but also experience the thrill of obtaining them. Advanced Programming is a fast-paced course and is for the student who has an intense interest in computer science and intends to follow up with either of the AP computer science courses. At completion, successful students are qualified for placement in AP Computer Science A. For placement in AP Computer Science with Data Structures, students take the Computer Science Placement Exam.

Prerequisite: Geometry with an A-, or Honors Geometry or better. UC approved.

The Harker School – Upper School Course of Study

Computer Science, cont.

■ **Robotics Principles: Hardware*** (1 semester/0.5 unit)

This one-semester, post-programming pre-calculus-based course will focus on the fundamental principles of robotics hardware. Students will learn about the key elements of drive trains, electrical systems, wire routing, sensors, control interfaces, vision systems and manipulators. The students will learn about these concepts through the dissection of Robotex Avatar Micro (version 1) military grade ground drones. The students will disassemble/reassemble, document and CAD the existing subsystems, learn about the design and operational elements, and subsequently design and fabricate their own manipulators that will interface into the drones. A sufficient level of software will also be covered to allow for the control of the custom manipulators.

Prerequisite: Programming or Advanced Programming. UC approved.

■ **AP Computer Science A** (1 year/1.0 unit)

Students wishing to prepare for the AP Computer Science A examination should complete this course or AP Computer Science with Data Structures. Equivalent to a first-semester college computer science course, APCS is an introduction to the study of algorithms and basic data structures. Using a modern programming language chosen by the College Board, students complete a series of programming projects designed to reinforce the theory learned. Emphasis is placed on good software engineering practices including problem specification, design techniques, documentation and testing. The basic concepts include control structures, arrays, recursion, methods (including preconditions and post-conditions) and well-designed structured code. Students practice their programming skills through multiple projects, including writing Tetris and a word-analysis program. Currently, AP CS A uses the Java programming language. Additional information about topics covered is available on the College Board's website.

Prerequisite: Algebra 2/Trig. or Honors Algebra 2/Trig. Programming with an A- or better, or Advanced Programming with a B+ or better. UC approved.

■ **AP Computer Science with Data Structures** (1 year/1.0 unit)

The purpose of AP Computer Science with Data Structures is to challenge students who have demonstrated working mastery of and are current in fundamental programming concepts, since these may not be reviewed. The basic concepts include control structures, arrays, recursion, methods (including preconditions and postconditions) and well-designed structured code. Using a combination of assignments, worksheets and class discussions, students learn to use, create and analyze linked lists, smart arrays, stacks, queues, sets, maps, binary trees, binary search trees, heaps and graphs. Students study a variety of algorithms associated with these data structures along with searching and sorting algorithms and learn how to characterize their performance in terms of both space and time. Programming projects utilize the algorithms and data structures discussed to create a variety of programs including games such as Solitaire, Tetris and Chess. Students are also introduced to the concept of machine learning. Post the AP exam students work on a challenging final project that expects them to apply the knowledge gained during the course. A fitting candidate for this class possesses strong problem-solving skills and works independently, yet seeks help as needed. Specifically, this student has previously written numerous programs to solve math-based and array-based problems. Familiarity with object-oriented programming, particularly Java, greatly aids a student transitioning into this fast-paced, recursion-focused course.

Prerequisite: Algebra 2/Trig. or Honors Algebra 2/Trig. Advanced Programming with a A- or better. UC approved.

■ **Honors Data Structures*** (1 semester/0.5 unit)

Data Structures is a one-semester course that introduces elementary data structures and algorithms to students who are fluent in at least one programming language. It is taken by students who have completed AP Computer Science A (not AP CS A with Data Structures), and is typical of the second

The Harker School – Upper School Course of Study

Computer Science, cont.

course in computer science at most universities. Using a combination of programming assignments, worksheets and class discussions, students learn to use, create and analyze linked lists, smart arrays, stacks, queues, sets, maps, binary trees, binary search trees and heaps. Students study algorithms such as traversals, insertion, deletion of information across all these data structures, and learn how to characterize their performance in terms of both space and time. Programming projects utilize the algorithms and data structures discussed to create a variety of programs including games such as Solitaire.

Prerequisite: Algebra 2/Trig. AP Computer Science A with a B+ or better. UC approved.

■ Honors Advanced Topics in Computer Science* (fall and spring) (1 semester/0.5 unit)

Following AP Computer Science A with Data Structures or the semester-long Honors Data Structures course, students may continue their computer science studies with the Honors Advanced Topics courses (ATCS). These semester-long courses are very challenging courses taught at the college level with semester-long projects replacing daily assignments. These courses rotate year to year with the options for the next school year published in December.

Prerequisite: Prerequisites for all honors advanced topics in computer science courses will be: Data Structures with a B+ or better or AP Computer Science with Data Structures with a B+ or better. Subject to instructor approval. UC approved. Calculus can be taken prior to or concurrently with most ATCS courses. For those courses where calculus is a prerequisite, only seniors may take the course while simultaneously taking calculus.

Topics offered every year:

- Robot Kinematics Software (calculus prerequisite)

Topics offered in a two-year rotation:

- Computer Architecture
- Compilers and Interpreters

Topics offered in a four-year rotation:

- Expert Systems
- Neural Networks (calculus prerequisite)
- Programming Languages
- Numerical Methods (calculus prerequisite)

■ Honors Advanced Topics Computer Science: Robot Kinematics Software

In this one-semester course offered each year, students study how to make robots move to achieve useful goals. In typical beginners courses in robotics, the real world has to be simplified to make solutions possible. Such simplifications cannot always be used in the real world, in laser surgery for example. This course examines some practical aspects of robotics interfacing to the real world.

Beginning with a review of the mathematics underlying constrained movement (e.g., coordinate transformation using matrices, Jacobi functions, multivariable analysis), students will develop control programs for an articulated robotic arm to be able to thread a needle in various positions, for a robot car to follow a non-uniform curved path and other similar tasks. The practicality of their programs will be tested on robotic arms and vehicles. The course will build on students mathematical and programming experience to extend problem-solving solution space.

Prerequisite: Calculus

■ Honors Advanced Topics in Computer Sci: Compilers and Interpreters

In this one-semester course offered every other year, students study how language processors work and how to build a simple language translator. Beginning with a study of lexical and syntactic analysis, students learn how to use regular expressions, extended Backus-Naur grammar specification and how to construct both deterministic and non-deterministic finite state automata. Students will construct a scanner and a recursive descent predictive parser for a subset of the Pascal programming language. Using an Abstract Syntax Tree as an intermediate representation, students will learn the basics of semantic analysis

The Harker School – Upper School Course of Study

Computer Science, cont.

and will then turn their scanner and parser into an interpreter. Finally, students will study compiler back-end processing and create a code emitter that will emit code for a MIPS processor. They will demonstrate their completed language translator by running the resulting MIPS machine code on a MIPS emulator. This course is similar in content to the Stanford University course CS143: Compilers.

■ Honors Advanced Topics in Computer Sci: Computer Architecture

This course, offered every other year, introduces the student to computer architectures based on the Von Nuemann model. Students study Boolean algebra and digital logic, first building logic gates from transistors, then “earning” each logic chip they will use by constructing each circuit i.e., using their previously “earned” chips to earn the next chip.

Students learn combinatorial logic and sequential logic and learn how a memory element can represent an arbitrary set of Boolean expressions. Students design and build finite state machines and learn the relationship between finite state machines and computability. Projects include building an adder, a latch and a counter.

This culminates in building a simple 4-bit computer to begin understanding modern computer architecture.

Students then investigate implementing various software strategies such as building stacks and lists using their homebrew computer.

This course is similar to the MIT 6.004 Computation Structures course.

■ Honors Advanced Topics Computer Science: Expert Systems

This course will cover the history, concepts and implementation behind the theory and development of expert systems and why expert systems are a useful technology in the 21st century. The organizational concepts associated with spreadsheets (one-to-one), relational databases (one-to-many) and subsequently expert systems (many-to-many) will be examined. The operational details of expert system shells and specifically the RETE inferencing algorithm will be

explored. The students will learn to develop expert systems using the Jess expert system shell, which was developed by Sandia Labs (www.jessrules.com). The semester work will culminate in a student project where the students are required to develop an independent expert system application, perform the knowledge collection and engineering and then implement the system based on that knowledge collection. The course is similar in content to university courses on expert systems such as Comp. Eng./Comp Sci. 371 (University of Missouri).

■ Honors Advanced Topics Computer Science: Neural Networks

In this course the students will develop a basic understanding of parallel distributed processing (PDP) through the incremental development of artificial neural networks based on the fully connected feed-forward model similar to the multilayer perceptron. The students will develop an understanding of two models for memory and the differences between them: the “image” model and the “connectivity” model. The students will learn the history of the development of artificial neural network technology, the structure and the components of an artificial neural network. The students will build simple XOR networks from first principles and learn how they are trained and experience the problems associated with execution time and convergence. The construction of the network will be done in testable incremental steps so that the students understand the low level functionality. The students will subsequently extend their basic network framework to deal with the more complex problem of image recognition. This course is similar to university level courses such as CS-449: Neural Networks at Willamette University.

Prerequisite: Calculus

■ Honors Advanced Topics Computer Science: Numerical Methods

This course is an introduction to the fundamental elements of numerical methods covering both the basic pure mathematical elements as well as applications in modeling physical systems that utilize those elements. The course introduces basic numerical techniques

The Harker School – Upper School Course of Study

Computer Science, cont.

for finding roots and minima, solving systems of linear equations, integration and differentiation, solving differential equations, and performing integral transforms. These methodologies are then used to model systems that the students have seen in their physics courses. The students may work in any computer language in which they are proficient. The first half of the course is similar to COSC 250 - Introduction to Numerical Methods at Indiana University of Pennsylvania and CS309 at Loyola University Chicago. The application portion of this course is similar to PHYS 404 - Computational Techniques in Physics at the University of Nevada, Las Vegas.

Prerequisite: Calculus

■ Honors Advanced Topics Computer Science: Programming Languages

This course is an introduction and overview to a number of programming languages including, but not limited to, Assembly (6502 and 8086), C, FORTRAN, BASIC, FORTH and LabVIEW. Students will learn the history, purpose, theory and use of each language under study. The strengths and weaknesses of the languages are evaluated and students learn to write programs in each of them. They will examine data storage in terms of stacks, registers, accumulators, program counters, segmented and flat memory models, RISC and CISC chip architecture, integer data types (both signed and unsigned), fixed point and floating point storage, vectorization and simple strings. Students will explore the elements of underflow, overflow, eps, min, max, infinity and not-a-number representations and how each language handles them. After the completion of the course students will have sufficient background to be able to select an appropriate programming language that can most effectively address any particular problem that is under study.

The Harker School – Upper School Course of Study



English

The English curriculum focuses on both the teaching of compositional skills and the critical analysis of literature. Students read sophisticated literary works, learn the steps of literary analysis and develop intellectual curiosity and a love of reading. Throughout the four-year program the students become more discerning readers and master more advanced rhetorical patterns. We foster students' use of clarity, logic, tone and style in their writing.

Course Descriptions

■ English 1: The Study of Literary Genres (1 year/1.0 unit)

In this course, students study a broad range of literature by reading works in multiple genres: lyric poetry, epic poetry, short and long fiction, and drama. Many of these selections feature variations on the archetypal journey of the hero. Students are introduced to literary criticism in the form of articles written about the course texts. Required readings include *The Odyssey* and *A Midsummer Night's Dream* or *Twelfth Night* (honors). In addition, students read poetry by, among other poets, Shakespeare, Hayden, Pastan, Owen, Auden and Heaney; and short fiction by authors including Maupassant, Poe, Updike, Tan and García Márquez. All students also read one novel: *Passing* or *Their Eyes Were Watching God* (honors). Written assignments include analytical essays, a personal narrative and researched writing. By composing multiple drafts and conferencing with their teachers about their work, students learn to progress beyond simple proofreading to thorough revision of both content and form. This course makes extensive use of *The Bedford Handbook*, reviews grammar topics, and helps students to incorporate this knowledge into their writing. By working with Membean, a multimedia vocabulary learning tool, as well as studying new words in context, students increase their facility with the English language.

Prerequisite: None. UC approved.

■ English 2: A Survey of British Literature (1 year/1.0 unit)

Grade 10 introduces the students to British authors from the Middle Ages through the 20th century. Reading prose, poetry and drama that represents the major movements in British literature, students study these works in their respective social and historical contexts.

Readings include *The Canterbury Tales*, *Macbeth* or *Hamlet* (honors), *Frankenstein* and *The Importance of Being Earnest*. In addition, students study selections of 17th-century writers (Milton, Donne) and of Romantic and Victorian poets, including Blake, Wordsworth, Coleridge, Shelley, Byron, Keats and Browning. Moreover, students expand their base of literary terms as an aid to interpretive reading. The grade 10 course focuses more intensely on the students' development of critical writing skills; students write and revise analytical essays using the comparison/contrast, persuasive and argumentative modes. Individual conferences with teachers ensure that students focus upon improving their writing grammatically and stylistically at both the sentence and paragraph levels.

Prerequisite: English 1 or Honors English 1. UC approved.

■ English 3: A Survey of American Literature (1 year/1.0 unit)

Grade 11 English focuses on major American authors who have shaped the scope of the American experience. The curriculum progresses chronologically, as it does in grade 10. Students will make thematic connections in works of fiction, essays and poetry across literary periods. Required readings include *The Scarlet Letter*, *The Awakening*, *The Great Gatsby* and *The Bluest Eye*. In addition, students read selections from American literature that include short works and poems by the following authors: Bradstreet, Franklin, Paine, Poe, Emerson, Faulkner, Whitman, Dickinson, Jacobs, Douglass, Hughes, Bishop, Ellison, O'Connor, Rich and Plath. Students write papers that demonstrate a solid grasp of texts, literary terms and rhetorical patterns introduced in previous courses and hone their skills in argumentation.

Prerequisite: English 2 or Honors English 2. UC approved.

The Harker School – Upper School Course of Study

English, cont.

English Honors Classes

The principal difference between honors and non-honors courses is in the complexity of assignments. Honors sections require more advanced writing skills and greater mastery of grammar and conventions of usage. While all English classes include many and varied papers, those written in honors courses feature greater depth and more comprehensive content. Students demonstrate their ability to express critical evaluations of the texts both in their written work and in their class participation.

■ **Honors English 1: The Study of Literary Genres**
(1 year/1.0 unit)

■ **Honors English 2: A Survey of British Literature**
(1 year/1.0 unit)

Prerequisite: English I or Honors English I and departmental approval. UC approved.

■ **Honors English 3: A Survey of American Literature**
(1 year/1.0 unit)

Prerequisite: English II or Honors English II or and departmental approval. UC approved.

English Electives

The English department offers a variety of electives for seniors, which will stimulate their interest through courses that are designed to deepen appreciation for literature. Course offerings focus on genres, literary periods, the history of ideas, individual authors or literary stylistics. Electives offered in the fall semester require a subject-specific research essay. With the exception of AP English: Literature and Composition, juniors, with approval, may take the electives in addition to the required English 3 course.

■ **AP English: Literature and Composition**
(1 year/1.0 unit)

This literature and composition component of Advanced Placement English develops students' skills from previous study of British and American literature and prepares students for the rigorous end-of-year exam. Students will familiarize themselves with a wide

range of literary responses to the human condition and participate in the discourse at an intensive level demonstrating independence of thought. Students will experience an abundance of literary voices such as Samuel Beckett, Elizabeth Bishop, Albert Camus, Charles Dickens, Emily Dickinson, John Donne, T.S. Eliot, John Guare, Thomas Hardy, Langston Hughes, James Joyce, Chang-Rae Lee, Toni Morrison, Mary Oliver, Sylvia Plath, Adrienne Rich, William Shakespeare, Tom Stoppard and Virginia Woolf. As this course intends to simulate a college-level seminar, students will be expected to achieve clarity of expression in discussion as well as in writing. Students will be encouraged to engage in literary dialogue with their peers and instructor, so the environment will be dynamic and student-centered. College-level writing skills will be stressed. Close textual analysis and interpretive essay writing will be practiced daily with a view towards considerations of structure, style, theme and socio-historical context. Frequent timed essays and occasional objective exams on reading assignments will model the AP exam. Informal, exploratory writing activities will serve as aids in prompting discussion and in evaluating whether or not students are balancing generalizations and specific illustrative details. Revision skills will be refined through peer editing and teacher evaluation. Assessments include one-on-one conferencing between instructor and student, rubric creation and analysis, and written feedback regarding prose style, rhetoric, and attention to standard grammar and syntax. In semester two, students will complete a researched essay.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ **English 4: 20th-Century American Drama***
(1 semester/0.5 unit)

This course explores the period of classic drama in the United States, as well as more contemporary works. Students will learn how to read scripts from a theatrical and literary perspective while considering the plays in their historical and cultural contexts. Viewing these plays under the lens of modernism, students will also discuss many 20th-century themes, including

* indicates a semester course

The Harker School – Upper School Course of Study

English, cont.

the problems of alienation, angst and anomie in an American society that struggles to maintain the idyllic and often illusory American Dream. To truly imagine these works on stage, the class will often perform small sections of the plays in class and also analyze segments of their film counterparts. To accomplish this task, students will read from the plays of Eugene O’Neill, Sophie Treadwell, Clifford Odets, Tennessee Williams, August Wilson, Edward Albee, David Mamet and Tony Kushner.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: 20th-Century American Poetics* (1 semester/0.5 unit)

This course traces the development of the 20th-century American poetic voice to help students acquire a deeper understanding of prosody and its power to express both personal and cultural concerns. While reading groundbreaking poets such as e.e. cummings, Gertrude Stein, Sylvia Plath, Elizabeth Bishop and Allen Ginsberg, students will also learn of the social, political and literary forces that led to specific poetic movements. As students examine poems, poetic statements, biographical excerpts, era film clips and interviews, they will consider relationships between the various poetic eras and become more comfortable reading and analyzing the work of later poets who tend to discard linear narrative in favor of image, sound, formal experimentation and abstraction. Students will even get a chance to write a few of their own original poems. Ultimately, by reviewing basic poetic literary techniques, this course aims to foster a love and excitement of poetry’s complexity and allow students to feel inspired by a poem that might have seemed otherwise incomprehensible.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Asian Masterpieces* (1 semester/0.5 unit)

Most students have familiarity with the great epics and novels in the Western tradition which run the gamut from *The Odyssey*, to such novels as *Huckleberry*

Finn. Certainly, these works and others represent keystones in their respective genres, but what of the Eastern literary tradition? In this light, *Asian Masterpieces* seeks to shine the light on the towering figures of modern writing from Asia Minor and the Indian Subcontinent, while simultaneously keeping its feet firmly planted on the grandiose and epic past of these cultures. The course will feature short fiction, novels and poetry, all the while exploring the shifting dichotomies of East and West and old and new, while developing a definition of the immigrant experience in a post-colonial and globalized age. The class will begin with classical texts that could include the mythical epics of India, Myanmar and Mongolia, and then shift focus to writers of the post-colonial era; which may include Rushdie, Lahiri, Pamuk, Gibran, Roy and others. Through reading, writing, group activity and spirited discussion, students will formulate their own individual answers to the question: How does Asia’s mythos influence the writing of the present, and what do modern writers in the Asian diaspora teach about creating meaning in a world wherein globalization blurs the line between East and West?

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Gothic Literature: Vampires and the Macabre* (1 semester/0.5 unit)

This course is designed to explore the origins and development of the Gothic genre, its generic conventions and its influential impact on the literary world. It will investigate the beginning of the movement (as a rejection of the logic and reason of the Age of Enlightenment), its links with Romanticism (emotional excess and sentiment), and its emphasis on terror, horror, psychology, and social commentary and criticism. Students will address important questions about the nature of horror and terror: Why do these texts thrill readers? What is the nature of evil? Why is the alluring antagonist so appealing? How do texts reflect the cultural climate of their production? What is the psychology of characters and how does this link to human nature? How have writers presented the evil and

The Harker School – Upper School Course of Study

English, cont.

grotesque and why are readers fascinated with “the abomination”? A range of authors will be studied such as The Graveyard Poets, Walpole, Radcliffe, Maturin, Poe, and both Stoker’s and Polidori’s “Vampire” tales.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: The Graphic Narrative* (1 semester/0.5 unit)

The Graphic Narrative semester seminar considers a burgeoning literary genre esteemed by modern scholars. Focusing on major representative texts that define and redefine the medium, students will learn how to approach the graphic narrative as a distinct literary and visual form. Through reading, writing and analyzing the written word and the visual depictions on the page, students will strengthen their visual literacy skills while building upon critical thinking and analytic skills. Students will become fluent in the language specific to “sequential art”; they will also quickly come to see that their literary analysis arsenal applies in every respect to graphic texts. Texts include Spiegelman’s *Maus*, Satrapi’s *Persopolis*, McCloud’s *Understanding Comics*, and others.

Prerequisite: English 3 or Honors English 3 or departmental approval. UC approved.

■ English 4: Great Novels* (1 semester/0.5 unit)

This course engages students in the critical reading of highly acclaimed novels by European, Asian and American writers. Through these works, written between the early 19th and the later 20th centuries, we will observe the development of the novel as a genre and examine the various social, psychological and ethical issues that interested their creators. Choosing from a rich bank of approximately 30 texts, instructors engage students in a reading of novels such as Austen’s *Pride and Prejudice*, Dostoevsky’s *Notes from the Underground*, Forster’s *A Room with a View*, Hemingway’s *The Sun Also Rises*, Márquez’s *Love in the Time of Cholera*, Proulx’s *The Shipping News*, Roy’s *The God of Small Things* and Wharton’s *Age of Innocence*. Written assignments will

be primarily analytical; however, the writing of personal responses will also be encouraged.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Jack Kerouac and the Beat Generation* (1 semester/0.5 unit)

The literary movement known as the Beat Generation grew from feelings of disaffection and alienation amid the conformity in America during World War II and its aftermath. What began among a few friends whose interests ranged from jazz music to Buddhism evolved into the dominant voice of social protest during the Cold War era, opposing American materialism and imperialist practices, and advocating greater personal freedoms, acceptance of differences, pacifism and eco-consciousness. In his writing Kerouac celebrated his own life, thoughts and spiritual search in a direct, frank, nontraditional style echoing jazz rhythms and the faster pace of modern society. The course will study the life and work of Kerouac in particular while also examining poems, essays and memoirs of numerous other Beat authors, particularly the poets Allen Ginsberg, Gary Snyder and Lawrence Ferlinghetti.

Texts include the biography *Desolate Angel: Jack Kerouac, the Beat Generation, and America*, by Dennis McNally; *The Portable Beat Reader*, edited by Ann Charters; and four Kerouac novels: *On the Road*, *The Dharma Bums*, *The Subterraneans* and *Big Sur*.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Justice in Literature* (1 semester/0.5 unit)

If literature can be defined as the aesthetic expression in writing of human concerns, the human desire for justice has been, since the beginning, a principle theme. But what constitutes justice? As humankind evolves and cultural attitudes shift, so do notions of what is just and who should do the judging. Is justice merely a relative concept, defined by cultural mores, or are there absolutes? What is the relationship between individual freedoms and civilization’s need to prescribe

The Harker School – Upper School Course of Study

English, cont.

limits on behavior? And how should the individual and society react when justice is found to be imperfect or absent? The class will explore these and other issues while reading a variety of literary texts spanning from ancient Greece to contemporary America: Plato's *The Trial of Socrates*, Shakespeare's *The Merchant of Venice*, Melville's *Billy Budd*, Camus' *The Stranger*, *The Exonerated* by Jessica Blank and Erik Jensen, and *Zeitoun* by David Eggers.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Literature into Film* (1 semester/0.5 unit)

Students in Literature into Film read an eclectic selection of influential novels and plays and then view the films these works have inspired. Comparison and contrast is the chief mode of discussion, and students write a variety of essays on topics that emerge from such discussion. Starting with an introduction to film history, terminology and narrative devices, students acquire the language they need to combine literary analysis with the critical study of films. The class also considers the technologically innovative *Citizen Kane* as a case study to highlight particular techniques. Titles currently in the course of study include *No Country for Old Men*, *A Room with a View*, and *Do Androids Dream of Electric Sheep*, among many others.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Literature of the Holocaust* (1 semester/0.5 unit)

In this course, students examine a watershed event in human history in order to understand better the beliefs and attitudes which generate violence, bigotry, racism and eventually genocide and with which humans still contend in the 21st century. In addition to learning about the atrocities of which ordinary humans are capable, students will study examples of selflessness, courage and human decency, along with the social pressure to remain an indifferent bystander.

While studying recent history, students will also consider the present-day challenge of creating a society

in which human freedom and dignity are the prevailing norms. Course texts include Spiegelman's *Maus*, Wiesel's *Night Trilogy*, Levi's *Is This a Man*, Arendt's *Eichmann in Jerusalem*, and Kulka's *Landscapes of the Metropolis of Death*.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Madness in Literature* (1 semester/0.5 unit)

The motif of mental instability recurs often in literary works because it raises important questions about the nature of the human mind and its creative processes: How do we delineate the difference between the sane and the insane? What is the correlation between madness and creativity? How does our cultural experience shape our perception of madness in human beings? The course will investigate madness in a variety of characters in world literature. Readings include *Medea*, *King Lear*, *The Yellow Wallpaper*, *Notes from the Underground*, *Long Day's Journey into Night*, Sylvia Plath's poetry and a more recent text, *Girl Interrupted*.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Modern European Drama* (1 semester/0.5 unit)

This course provides an introduction to the field of modern European drama, stretching from the late 19th century to the middle of the 20th century. It presents plays from all over Europe – Norway, Sweden, Italy, England, Russia, France – in light of theories of Modernity and Modernism. Students learn how to read scripts from a theatrical perspective, and they learn how to analyze and critique live and filmed productions of plays. The reading list changes from year to year, drawing upon the works of Ibsen, Strindberg, Chekov, Shaw, Brecht, Pirandello, Beckett, Genet and Ionesco.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

The Harker School – Upper School Course of Study

English, cont.

■ English 4: Mystery and Detective Fiction* (1 semester/0.5 unit)

This course explores the origins and development of the mystery/detective fiction genre, its generic conventions and its connection with shifting social ideology. How are detectives and criminals characterized? How does this representation change over time? What are the thought processes, methodology and psychology of the detective? How do crimes reflect the time period when the stories were written? This course investigates such questions by reading a range of texts including Sophocles' *Oedipus the King*, Agatha Christie's *And Then There Were None* and Raymond Chandler's *The Big Sleep*. There are also short stories by Poe, Melville, Conan Doyle (with his infamous Sherlock Holmes) and G. K. Chesterton.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Postmodern Literature* (1 semester/0.5 unit)

This course focuses on literary texts written since World War II which by nature of their subject matter, mood and narrative techniques are readily identified as postmodern. What is it about these works that distinguishes them from modernism? Most share the gloomy vision of society and human nature that emerged in the aftermath of World War I, but these later works contain a greater sense of absurdity, a playfulness of style, increased fragmentation – any number of techniques that serve to place them in this separate category, reflecting a significant cultural trend. Writers include Samuel Beckett, Kurt Vonnegut, Jr., John Barth, Donald Barthelme, Milan Kundera, Margaret Atwood and Don DeLillo. Students will become familiar with the full array of postmodern elements, learning to recognize them not only in our core texts but also in film and television, music, art, and architecture. They also will examine the relationship between postmodern literature and contemporary culture, observing how art can serve both as an emblem of and commentary on society.

Prerequisite: English 3 or Honors English 3 or departmental approval. UC approved.

■ English 4: Satire and Comedy* (1 semester/0.5 unit)

A study of the theories and practice of satire and comedy is the focus of this class. Readings will range from works of the 16th century to contemporary authors. Works by writers such as Shakespeare, Behn, Twain, Burgess and Steve Martin form the core of the curriculum. Students will compare and contrast the works of these authors as each satirically presents his/her perceptions of the world.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Shakespeare — Comedies, Tragedies, and Romances* (1 semester/0.5 unit)

Shakespeare — Comedies, Tragedies, and Romances provides a comprehensive exploration of Shakespeare's plays as well as giving students a sense of life in Shakespearean England. Students gain a sense of the broad range of genres and themes that Shakespeare explored, and the ways he used race, class and gender to fuel his plays' central conflicts. The course also conveys a sense of Shakespeare's enduring appeal to a diverse audience, which at the time he wrote, represented all socioeconomic levels of Elizabethan society and included characters who represented kings and clowns, thwarted lovers, sharp-tongued heroines, and some of literature's most chilling villains.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ English 4: Southern Fiction* (1 semester/0.5 unit)

In "A Southern Mode of the Imagination," Allen Tate maintains that the literature of the modern South reveals the "inner strains, stresses, tensions, the shocked self-consciousness of a highly differentiated and complex society." This course will examine the Southern imagination as it reveals itself in novels by William Faulkner (1897-1962) and Pete Dexter (b. 1943), in drama by Tennessee Williams (1911-1983) and in short fiction by Eudora Welty (1890-1980) and Flannery O'Connor (1925-1964). The goal is to

The Harker School – Upper School Course of Study

English, cont.

explore the South of these authors through a close reading of their novels and short stories and through consideration of the historical context of the work. The course will serve to identify and analyze some general characteristics of Southern literature, including a focus on a common Southern history, the significance of family, a sense of community and one's role within it, the region's dominant religion and the burdens and rewards religion often brings, issues of racial tension, land and the promise it brings, a sense of social class and place, and the use of a unique and specific Southern dialect.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ **English 4: Speculative Fiction and Society: Science Fiction and Fantasy*** (1 semester/0.5 unit)

As Ursula Le Guin says in her National Book Award acceptance speech, "The fantasist, whether he uses the ancient archetypes of myth and legend or the younger ones of science and technology, may be talking as seriously as any sociologist – and a good deal more directly – about human life as it is lived, as it might be lived, and as it ought to be lived." Students will explore speculative fiction not only as a genre, but also as a new way of perceiving established ideas about humanity, history and science. They will begin by examining the historical and theoretical underpinnings of speculative fiction and the ways this fiction has been used as a vehicle for commentary on contemporary society. In the process, the students will become familiar with the characteristic themes and styles employed by speculative fiction writers. By researching a work of speculative fiction, students will also reinforce their competence in selecting and evaluating sources, synthesizing the ideas of other scholars, and using the MLA style of documenting sources and integrating quotations and textual support into their papers. Works include short stories, novels and essays; authors may include Isaac Asimov, Margaret Atwood, Ted Chiang, Karen Joy Fowler, Robert Heinlein, Ursula Le Guin, George R. R. Martin, George Orwell, and H. G. Wells.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ **English 4: A Study of Short Fiction*** (1 semester/0.5 unit)

This course will examine the origins of the modern short story while celebrating the diversity of the short story genre. With a large and eclectic group of writers to choose from, we will focus on key elements of the genre, analyzing plot-driven narratives, the effective use of setting to convey meaning, character development, theme, the use of symbols, and point of view. This course stresses close critical reading and discussion of selected short stories, and we will read selections from such writers as Stephen Crane, Amy Hempel, William Faulkner, Raymond Carver, Ernest Hemingway, Anton Chekhov, Flannery O'Connor and James Baldwin, among others.

Students will also examine critical theories and use those theoretical lenses to analyze the social, political and economic conditions inherent within the works. Students will keep journals and will produce one original work of short fiction over the course of the semester, along with several critical analysis papers. The course culminates in the Literary Journal Project in which students apply their skills in the analysis of contemporary short fiction.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.

■ **English 4: Art of Poetry and Fiction*** (1 semester/0.5 unit)

This course, previously titled Creative Writing, is designed to give students an opportunity to analyze fiction and poetry written by both past and present masters of the craft, and then experiment with writing original fiction and poetry. The course will be divided into two phases. During the first phase students will study the models and techniques used by poets and fiction writers. By examining and discussing poetry from a technical point of view, students will gain an understanding of the language and forms of poetry, as well as imagery, figurative language, rhythm, tone and sound. In the study of short fiction, particular emphasis

The Harker School – Upper School Course of Study

English, cont.

will be placed on elements of craft such as conflict, structure, character, tone, point of view and dialogue. During the second phase, students will have their writing discussed by the class in a workshop setting. After students generate ideas through reading and writing exercises, students will write their own fiction and poetry. During the workshop, students will gain experience in constructive criticism through individual conferences, written comments and peer reviews. Constant revision is required, so students should be prepared to receive criticism and use it to find their own voices as writers.

Prerequisite: English 3 or Honors English 3 and departmental approval. UC approved.



The Harker School – Upper School Course of Study



Global Online Academy

Harker is a member of this consortium of independent schools from around the country and world. There is no requirement for Harker students to take a Global Online Academy course, but students may find that these elective offerings, taught through a different medium by teachers from member schools and taken with other students from these schools, enrich their education. All GOA courses have asynchronous components (students participate each day on their own schedules) and synchronous components (when students collaborate together or work with their teacher, generally using video conferencing software). A GOA course counts as one of a Harker student's six courses - it cannot be taken as an Extra Period Option course. The student will have a "free" period in the schedule for the GOA course, but significant time and energy must be committed to the GOA course both during this "free" period and during traditional evening homework time. Basic logistical requirements to take a GOA course include having Skype installed on the computer, but individual courses may have additional requirements. A student who is interested in taking a GOA course must go to the GOA website (www.globalonlineacademy.org) to read the full description of the course and register and then contact the Harker academic dean for further information. Registration for a GOA course is a multistep process that begins with these steps.

Yearlong (1.0 units):

- Arabic Language through Culture I
- Arabic Language through Culture II
- Chinese Language through Culture I
- Japanese Language through Culture I
- Japanese Language through Culture II
- Multivariable Calculus

Fall (0.5 units):

- Applying Philosophy to Global Issues
- Business Problem-Solving
- Creative Nonfiction
- Filmmaking
- International Relations
- Introduction to Investments
- Introduction to Legal Thinking
- Microeconomics
- Number Theory
- Poetry Writing
- Problem-Solving with Engineering Design
- Race & Society
- Social Psychology

Fall and Spring (0.5 units):

- Bioethics
- Computer Science I: Computational Thinking
- Global Health
- Graphic Design

Fall and Spring (0.5 units), cont.:

- Introduction to Psychology
- iOS App Design
- Medical Problem-Solving I
- Positive Psychology

Spring (0.5 units):

- 9/11 in a Global Context
- Abnormal Psychology
- Advocacy
- Architecture
- Climate Changes & Global Inequality
- Computer Science II: Analyzing Data with Python
- Computer Science II: Game Design and Development
- Computer Science II: Java
- Digital Photography
- Entrepreneurship in a Global Context
- Fiction Writing
- Game Theory
- Gender Studies
- Genocide and Human Rights
- Graphic Design
- Linear Algebra
- Macroeconomics
- Medical Problem-Solving II
- Neuropsychology
- Prisons and the Criminal Law

The Harker School – Upper School Course of Study



History and Social Science

The history department introduces students to the disciplines of history and the social sciences. We cover not only the facts and figures of history but also the great concepts, controversies, perceptions and philosophies of the past. In doing so, we hope that Harker students will become knowledgeable, ethical and responsible citizens.

Required Courses

In grade 9, students satisfy their history requirement by taking either World History 1 or World History 1 Honors.

■ **World History 1: Early Civilizations through the Renaissance** (1 year/1.0 unit)

This course provides students with an overview of world history from early river valley civilizations through the early modern era (5000 B.C.E. – 1600 C.E.). Students will study all the principal political, social, economic, religious and intellectual developments of Europe, Africa, Asia and the Americas. All the major world religions are introduced and students will leave with an understanding of the world as an interconnected, dynamic, global society. Skills such as document evaluation, thesis construction, essay writing and the research process are introduced and practiced.

Prerequisite: None. UC approved.

■ **World History 1 Honors** (1 year/1.0 unit)

This course provides a substantive introduction to world history from early river valley civilizations circa through the early modern era (circa 5,000 B.C.E. - 1600 C.E.) The course emphasizes a global and cross-cultural approach to the understanding of the evolution of human societies in the Near East, China, Africa, India, the Middle East, the Americas, the Mongols and Europe with a particular emphasis on the study of world religions, political and economic systems, social orders and cultural practices. Knowledge of the research process, the use of primary source documents, essay writing and a comparative and analytical approach to history are emphasized. The course is designed to prepare students for higher level history and social science courses.

Prerequisite: None. UC approved.

In grade 10, students satisfy their history requirement by taking regular or honors World History 2, AP World History or AP European History.

■ **World History 2** (1 year/1.0 unit)

In this yearlong course, the period from the Scientific Revolution to the turn of the new century is studied (1600-2000 C.E.). The first semester focuses on Europe, and the second semester devotes one month each to Asia, South Asia, Africa and the Middle East. Political, economic, intellectual, social and artistic movements and ideas are studied. These include, but are not limited to, mercantilism and free market capitalism, political theory and governments from absolutism, to representative democracies, the Agricultural and Industrial Revolutions, imperialism, nationalism, militarism and socialism. Skills such as document evaluation, essay writing and the research process are practiced and emphasized.

Prerequisite: Completion of grade 9 history requirement. UC approved.

■ **World History 2 Honors** (1 year/1.0 unit)

This yearlong, honors-level course will offer students the opportunity for in-depth study of the modern era from 1450-1980 in four regions of the world; Europe, Latin America, East and Southeast Asia, and South Asia. Emphasis will be placed on using and interpreting primary and secondary sources to gain a deeper understanding of the social, intellectual, political, economic and cultural history in these regions. Students will be expected to keep abreast of current events and to be able to relate those events to the history of the region. Additionally, students will engage in cross-regional comparative analysis and research projects allowing individualized exploration.

Note: This course will not prepare students for the AP

The Harker School – Upper School Course of Study

History and Social Science, cont.

exam in either World History or European History.

Prerequisite: Completion of grade 9 history requirement and departmental approval.

■ AP World History (1 year/1.0 unit)

Intended to prepare students for the AP examination, students study the history of Asia, the Americas, Europe and Africa utilizing a thematic approach that covers change and continuity over time.

Interaction among societies and regions; the impact of technology's demographics and economics on both people and the environment; social structures in differing societies; political structures and organizations; and religious, cultural and intellectual developments are studied. The mastery of content material, analytical essay writing, the evaluation of primary source documents and historical research are also emphasized.

Prerequisite: Completion of grade 9 history requirement and departmental approval. UC approved.

■ AP European History (1 year/1.0 unit)

Intended to prepare students for the AP examination, the course requires a depth and breadth of study designed to challenge students. The course material spans the time period from 1400 to the present in all parts of Continental Europe and Great Britain with careful examination of major political, social, economic, intellectual and religious trends. In addition to the discussion of content material, the mastery of analytical essay writing, the evaluation of primary source documents, historical research and daily student participation are emphasized.

Prerequisite: Completion of grade 9 history requirement and departmental approval. UC approved.

In grade 11, students satisfy their history requirement by taking regular, honors or AP U.S. History.

■ United States History (1 year/1.0 unit)

This yearlong course is a topical survey of the history and culture of the United States from the colonial era to the present. Topics include the interaction of Native American, European and African populations, the Constitution and Bill of Rights, the impact of the Industrial Revolution, the Depression and the impact of World War II. Themes pertaining to current history include the civil rights movement, the turmoil of the 1960s, the crises of Vietnam and Watergate, and East-West relations. Economic developments, political and religious trends and social history are all covered. In addition to the discussion of content material, analytical essay writing, the evaluation of primary source documents, historical research and daily student participation are required.

Prerequisite: Completion of grade 10 history requirement. UC approved.

■ Honors United States History (1 year/1.0 unit)

This yearlong course is a survey of United States history from the pre-Columbian period to the present, with emphasis on the in-depth study of movements in the 20th and 21st centuries. Students will use and interpret advanced primary and secondary sources to gain a deeper understanding of political, economic, social, intellectual and cultural history, and to develop analytical arguments by selecting and using applicable historical evidence to support claims. The course will also include regular research projects and presentations, including a long-form written research paper.

Note: This course will not prepare students for the AP exam in U.S. History.

Prerequisite: Completion of grade 10 history requirement and department approval. UC approved.

The Harker School – Upper School Course of Study

History and Social Science, cont.

■ AP United States History (1 year/1.0 unit)

Intended to prepare students for the AP examination, this course requires a depth and breadth of study designed to challenge students. In AP U.S. History, each of the topics in the regular course is studied with a greater intensity, as the roots and impact of major social, political and economic trends are more closely examined. In addition to the discussion of content material, the mastery of analytical essay writing, the evaluation of primary source documents, historical research and daily student participation are emphasized.

Prerequisite: Completion of grade 10 history requirement and department approval. UC approved.

systematic and scientific study of the behavior and mental processes of human beings. Students become familiar with the various branches of psychology and the methodologies used by psychologists. Physiological, psychodynamic and behavioral schools of thought are all addressed. Key topics include personality theory, developmental psychology, psychopathology and treatment, theories of motivation, emotion and learning, and social psychology. Students are evaluated on a variety of assignments including projects, quizzes and tests and are introduced to psychological research.

Prerequisite: AP Psychology is open to seniors who have completed one of the following: 1) AP or Honors U.S. History with departmental approval; 2) U.S. History with an A; or 3) U.S. History with an A- and who are approved for an honors or AP science course senior year. UC approved.

Yearlong History Electives

The Harker School's history department offers six yearlong history electives. We offer the aforementioned World History 2 Honors, AP European History and AP World History that students may take in grade 11 or grade 12 if they qualify and have not already taken in grade 10. We also offer the following courses:

■ AP Art History (1 year/1.0 unit)

Intended to prepare students for the AP examination in art history, the course is a survey of world art from pre-history to the present with a strong emphasis on Western art. Students will develop a vocabulary while studying all major forms of artistic expression including painting, sculpture and architecture within diverse historical and cultural contexts. Image identification, critical analysis and evaluation of both context and aesthetics are emphasized.

Prerequisite: World History 1 or World History 1 Honors and departmental approval. UC approved.

■ AP Psychology (1 year/1.0 unit)

Intended to prepare students for the AP examination in psychology, the course introduces students to the

■ AP United States Government and Politics (1 year/1.0 unit)

Intended to prepare students for the AP examination in United States government and politics, this course examines the foundations of our political institutions and how these systems function. Students study the role of political parties, special interest groups, the media and individuals within the development of public policy and also examine recent Supreme Court rulings and their impact on civil rights and liberties within our country. The course will provide students with analytical perspective on our government and political system. Starting in 2018-19, this course is a yearlong course.

Prerequisite: U.S. History or AP U.S. History and departmental approval. UC approved.

Semester History Electives

■ History of the Holocaust and Genocide* (1 semester/0.5 unit)

This course is a semester-long, in-depth study of the causes, course and consequences of the Holocaust from a variety of perspectives. From this study, students will gain an understanding of the framework and themes that will be repeated in acts of genocide in other countries and will use that knowledge to conduct

The Harker School – Upper School Course of Study

History and Social Science, cont.

individual research on other genocides including in the Congo, Armenia, Cambodia, Rwanda, Guatemala, Native America, Bosnia and Darfur.

Prerequisites: Completion of grade 11 history requirement and department approval. UC approved.

■ **Honors Modern International Affairs*** (1 semester/0.5 unit)

The course (formerly International Issues & Public Policy) follows two tracks with the purpose of preparing students to excel in critical thinking and research. The first track is a seminar-style discourse on current events. Due to the variability of modern international affairs, the curriculum will change to cover international issues as they occur. In order to build skills to understand complicated international events students will be instructed in media literacy. Students will also use international news sources to examine events with diverse critical tools ranging from scholarly journals to books. The second track of the class works on developing research skills in order to write a college-level term paper. Students will choose their own international issues and write a policy analysis and proposal on that topic. During the semester, students will be instructed on research strategies and build skills to best leverage diverse resources. The end result of this track is a deeply researched original piece of scholarship. This class prepares students for the expectations of a seminar style class in college in addition to providing students with the experience of writing a college-level term paper.

Prerequisite: Completion of grade 11 history requirement and departmental approval. UC approved.

■ **Psychology*** (1 semester/0.5 unit)

This course is a semester-long, introductory-level course in psychology. Students will explore in some depth the subdisciplines of personality and development theory, states of consciousness, abnormal psychology and therapy, learning, memory and human behavior. Evaluation will include projects, presentations, quizzes and tests.

Prerequisite: Completion of grade 10 history requirement. UC approved.

■ **Western Political Thought and Philosophy*** (1 semester/0.5 unit)

This course introduces students to the intellectual history of Western Europe from the Greeks and late medieval thinkers such as St. Thomas Aquinas through 20th-century philosophers such as Nietzsche. It will focus on the ideas that inspired many of the political systems and movements that are the foundation of the modern western political world. It will also explore the relationship between intellectual history and the social, religious, cultural and economic movements and reforms that helped to shape and define European society. Primary sources will be used extensively and students will be asked to explore the ideas of such thinkers as Plato, Machiavelli, Locke, Kant, Rousseau, Mill, Burke, Smith, Marx, Hegel and Freud.

Prerequisite: Completion of grade 9 history requirement or departmental approval. UC approved.

■ **World Religions and Philosophy*** (1 semester/0.5 unit)

The purpose of this course is to introduce students to the five major world religions (Hinduism, Buddhism, Judaism, Christianity and Islam), along with other religious traditions such as Shamanism, Mysticism, Taoism, Confucianism and modern religious sects. Students will develop an appreciation for the cultural impact of those faiths on their respective societies.

Prerequisite: World History 1. UC approved.

The Harker School – Upper School Course of Study



Journalism

Journalism is the study of all aspects of media, from traditional newspapers to blogging. Students will come away with an understanding of basic journalism law, practices and skills used by journalists. Emphasis will be placed on styles of writing, photojournalism and design. Students will use a hands-on approach to publish the school's student newspaper and yearbook.

Course Descriptions

■ Journalism: Yearbook Concentration (1 year/0.5 unit)

Journalism: Yearbook Concentration students are responsible for the writing, editing and photography of the pages for Harker's yearbook, The TALON. The emphasis of this course is the achievement of higher-level communication skills and proficiency in desktop publishing. Students will learn a variety of writing styles and current design trends; moreover, they will learn how to use the latest in desktop publishing software. Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation.

Prerequisite: Application process.

■ Advanced Journalism: Yearbook Concentration (1 year/0.5 unit)

This course is an extension of the Journalism: Yearbook Concentration course and is designed for editors of the yearbook. The emphasis of this course is mastery of their skills in design, photography, editing and writing.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation.

Prerequisite: Application process.

■ Journalism: Newspaper Concentration (1 year/0.5 unit)

Journalism: Newspaper Concentration students are responsible for writing, editing, designing and laying out Harker's newspaper, The Winged Post. The emphasis of this course is the achievement of higher-level communication skills and proficiency in desktop publishing. Students will learn a variety of writing styles and current design trends; moreover, they will learn

how to use the latest in desktop publishing software. Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation.

Prerequisite: Application process.

■ Advanced Journalism: Newspaper Concentration (1 year/0.5 unit)

This course is an extension of the Journalism: Newspaper Concentration course and is designed for editors of the newspaper. The emphasis of this course is mastery of their skills in design, photography, editing and writing.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation.

Prerequisite: Application process.

The Harker School – Upper School Course of Study



Mathematics

Classes within the mathematics department are designed to broaden the mathematical knowledge and skills of our students. With offerings from algebra to AP Calculus and beyond, students are taught to master the fundamental processes while their problem-solving abilities are challenged with increasingly complex material. Placement is determined by the needs and talents of each individual. Students supplement their information resources with the required use of a graphing calculator and/or a laptop computer. Three years of study are required of all, though students are strongly encouraged to complete a four-year program.

Course Descriptions

■ Algebra 1 (1 year/1.0 unit)

This is a one-year course with some discussion of theory and application beyond basic manipulative skills. Topics include simplifying expressions, solving and graphing equations and inequalities, factoring polynomials, simplifying rational expressions, solving systems of equations and simplifying radicals. The course concludes with the quadratic formula. A scientific calculator is required; a graphing calculator is recommended.

Prerequisite: None. UC approved.

■ Geometry (1 year/1.0 unit)

This comprehensive two-semester, Euclidean-based geometry course emphasizes and integrates both inductive and deductive reasoning as well as visual-spatial skills. Congruence, similarity, parallelism, perpendicularity and properties of the Euclidean plane are integrated in a continual development and practice of mathematical reasoning. A balanced treatment of theory and application, as well as formal and informal reasoning as demonstrated through written proofs and problem-solving are an integral part of the course work. Students discover new theorems and explore transformations using the Desmos online tool. Once a new theorem is accepted and internalized, students are guided through the formal mathematical proofs of these new conjectures. A scientific calculator is required; a graphing calculator is recommended.

Prerequisite: Algebra 1. UC approved.

■ Honors Geometry (1 year/1.0 unit)

Areas of study include those listed for the Geometry course. In addition, this course places a greater emphasis on mathematical proof, construction, creativity and transformations. Students discover new theorems and explore transformations using Geometer's Sketchpad® dynamic software environment. Students are encouraged to explore challenging problems and stretch their sense of mathematics throughout the course. A graphing calculator is required.

Prerequisite: Algebra 1 and departmental approval. UC approved.

■ Algebra 2 & Trigonometry (1 year/1.0 unit)

This course builds upon the concepts introduced in Algebra 1. Students will study functions, relations, expressions and equations algebraically, numerically and graphically. Specific types of functions include: absolute value functions, polynomial functions, rational functions, and exponential and logarithmic functions. In addition, students will learn about radicals and complex numbers. The course concludes with an introduction to trigonometric functions and graphs, including problem-solving with oblique triangles. A graphing calculator is required.

Prerequisite: Geometry. UC approved.

The Harker School – Upper School Course of Study

Mathematics, cont.

■ Honors Algebra 2 & Trigonometry (1 year/1.0 unit)

Areas of study include those listed for the Algebra 2 course. In addition, this course places a greater emphasis on graphing, mathematical proof, exploration of variation, analytic geometry and trigonometric relationships. A graphing calculator is required.

Prerequisite: Geometry and departmental approval. UC approved.

■ Precalculus (1 year/1.0 unit)

This course provides a thorough study of relations, functions and problem-solving through algebraic, numerical and graphical techniques. The topics covered in this course are polynomial, rational, exponential, logarithmic, and trigonometric functions. Applications of the topics, such as trigonometric identities, conic sections, sequences & series are explored. The course concludes with an introduction to limits. A graphing calculator is required.

Prerequisite: Algebra 2 & Trigonometry and Geometry. Not available to grade 9 students. UC approved.

■ Honors Precalculus (1 year/1.0 unit)

This rigorous course provides a much deeper exploration of the precalculus curriculum. The areas of study include the topics covered in Precalculus and extend to cover vector operations and complex number operations in trigonometric form. In addition, polar and parametric equations, advanced matrix operations, and probability and statistics are explored. The course will conclude with an introduction to calculus. A graphing calculator and Mathematica are required.

Prerequisite: Algebra 2 & Trigonometry, Geometry and departmental approval. UC approved.

■ Finite Mathematics (1 year/1.0 unit)

This course is ideal for students who are not intending to study a STEM field in college, but whom nevertheless will need to use a broad range of mathematics applications and would like a

fourth year of math in high school. The course is a good choice for students seeking an alternative to an Advanced Placement (AP) course, or even to Precalculus. The main topics include finite mathematics, data analysis and mathematical modeling, and problem-solving.

Prerequisite: Algebra 2/Trigonometry. Seniors only. UC approved.

■ Calculus (1 year/1.0 unit)

This Calculus course is an excellent alternative to AP Calculus AB, especially for students whose interests lie outside of pure math or the science fields. Topics include the calculus of rational, exponential and logarithmic functions including limits, derivatives, antiderivatives and definite integrals. Students will view problems graphically, numerically and algebraically, focusing on applications of derivatives and definite integrals. Mathematica will be used throughout the course to enhance the learning and understanding of the various topics. A graphing calculator is required.

Prerequisite: Precalculus. Juniors and seniors only. UC approved.

■ AP Calculus AB (1 year/1.0 unit)

This college-level course covers the calculus of functions of one variable. The appropriate use of technology will be integrated into the course through the use of graphing calculators. Ideas are explored graphically, symbolically and conceptually, with an emphasis on correct mathematical argumentation. Topics covered include limits, continuity, derivatives, antiderivatives, techniques and applications of differentiation and integration, the Fundamental Theorem of Calculus, separable differential equations and slope fields.

Prerequisite: Precalculus and departmental approval. Not available to grade 9 students. UC approved.

The Harker School – Upper School Course of Study

Mathematics, cont.

■ Honors Calculus C with Multivariable Calculus (1 year/1.0 unit)

This college-level course is designed for students who have successfully completed Calculus AB. In the first semester students will complete the Advanced Placement Calculus BC curriculum, including advanced integration techniques, calculus of polar and parametric functions, Euler's method and Taylor series. During the second semester students will complete the same topics as Honors Multivariable Calculus up through multiple integrals. Students will be prepared for the BC Advanced Placement exam in May. Calculus AB and C cover in two years what Calculus BC and Multivariable Calculus cover in three semesters. A graphing calculator and Mathematica are required.

Prerequisite: AP Calculus AB and departmental approval. A 4 or 5 on the AP Calculus AB exam is recommended. Juniors and seniors only. UC approved.

■ AP Calculus BC (1 year/1.0 unit)

This intensive and fast-paced course is a rigorous study of single-variable calculus. Topics include all those listed under Calculus AB plus polar and parametric functions, Euler's method, polynomial approximations and Taylor Series. A graphing calculator and Mathematica are required.

Prerequisite: A- or better in Honors Precalculus and departmental approval. UC approved.

■ AP Statistics (1 year/1.0 unit)

AP Statistics is the high school equivalent of a one-semester, introductory college statistics course. In this course, students develop strategies for collecting, organizing, analyzing and drawing conclusions from data. Students design, administer and tabulate results from surveys and experiments. Probability and simulations aid in constructing models for chance phenomena. Sampling distributions provide the logical structure for confidence intervals and hypothesis tests. Students use a graphing calculator, Fathom statistical software and web-based java applets and activities to investigate statistical concepts. To develop effective statistical communication skills, students are required to prepare frequent written

and oral analyses of real data.

Prerequisite: Precalculus. Seniors only. UC approved.

Post-AP Courses

■ Honors Multivariable Calculus* (1 semester/0.5 unit)

This one-semester course studies the calculus of functions of several variables. Topics include vector functions and motions in space, partial differentiation, multiple integrals, line integrals, Green's Theorem, and Stokes' Theorem. A graphing calculator and Mathematica are required.

Prerequisite: AP Calculus BC and departmental approval. UC approved.

■ Honors Differential Equations* (1 semester/0.5 unit)

This course will focus on the theory and techniques for finding solutions to ordinary, first-, second- and higher-order linear differential equations. In addition, students will be introduced to Laplace Transforms and ideal functions. Mathematica and a graphing calculator are required.

Prerequisite: AP Calculus BC or Honors Calculus C and departmental approval. UC approved.

■ Honors Linear Algebra* (1 semester/0.5 unit)

This one-semester enrichment course will introduce students to advanced matrix algebra. Topics include Gaussian elimination, matrix operations, Eigenvalues and Eigen-vectors. A graphing calculator and Mathematica is required.

Prerequisite: AP Calculus BC or Honors Calculus C and departmental approval. UC approved.

■ Honors Discrete Mathematics* (1 semester/0.5 unit)

This one-semester course gives students an introduction to many mathematical areas of the non-continuous type. Specific topics to be covered include: logic; proof by induction; discrete calculus; voting methods and Arrow's Impossibility Theorem; weighted voting and power indexes; fair division

The Harker School – Upper School Course of Study

Mathematics, cont.

games; Euler and Hamilton paths/circuits and useful algorithms; graphs, networks and trees; critical paths for scheduling; Fibonacci numbers; fractals. Students may be asked to write code in Mathematica to facilitate learning.

Prerequisite: AP Calculus BC or Honors Calculus C and departmental approval. UC approved.

Advanced Topics Courses

■ Honors Advanced Topics Math: Information Theory I* (1 semester/0.5 unit)

Information Theory Part 1 is the first part of a two-part offering that explores the basic concepts of information theory, as initially described by Claude Elwood Shannon at Bell Labs in 1948. Information theorists have created a rich mathematical framework that addresses fundamental questions, such as: What exactly is information and how is it measured? How can we communicate it reliably and efficiently across distances? Are there any fundamental limits to communication? The course will explore all these questions. Topics covered include: source characterization, compression problems, common codes, entropy, source coding theorem; channel characterization, coding problems, Hamming and Reed-Solomon codes, channel capacity, channel coding theorem; Shannon's Theorem; and student projects on the state-of-art in compression algorithms and coding algorithms.

Prerequisite: One year of post-AP Calculus math courses. UC approved.

■ Honors Advanced Topics Math: Information Theory II* (1 semester/0.5 unit)

Information Theory Part 2 is the second part of a two-part offering that explores information theory, as initially described by Claude Elwood Shannon at Bell Labs in 1948. In the course, students will explore other applications related to the disciplines of gambling, statistics, physics, computer science, economics and philosophy. The course concludes with a student project that either develops further one of the above applications, or explores a new application of

information theory.

Prerequisite: Honors Advanced Topics in Math: Information Theory I. UC approved.

■ Honors Advanced Topics Math: Signals and Systems* (1 semester/0.5 unit)

Students in this college-level course will study continuous and discrete signal representation and the associated classification, system classification and response, and transfer functions. Fourier series and Fourier, Laplace, and z transforms will be used. Students will apply their learning to integrated sensing and information processing including networks, modulation, sampling, filtering, and digital signal processing. Mathematica will be used for computational solutions to problems.

Prerequisite: Honors Differential Equations and department approval. UC approved.

■ Honors Advanced Topics Math: Differential Equations II* (1 semester/0.5 unit)

Students in this college-level course will study first-order and higher-order linear, differential equations and Laplace Transforms. Other topics include linear systems of differential equations, nonlinear systems, chaos, eigenvalues, and boundary value problems. Students will use Mathematica extensively.

Prerequisite: Honors Differential Equations and department approval. UC approved.

Non-Math Elective

■ Engineering* (1 semester/0.5 unit)

This one-semester course introduces a variety of topics within engineering including the design process, energy and power, statics/mechanics, and economics (project analysis). Quantitative analysis will be used to support all claims. One goal of this course is to give students an introduction to engineering to help them decide if engineering (and maybe even a specific field within engineering) should be pursued at the university level.

Prerequisite: Precalculus. Seniors only. UC approved but as an elective course, not as a math course.

* indicates a semester course

The Harker School – Upper School Course of Study



Modern and Classical Languages

Courses in the modern foreign languages develop all the basic skills – listening, speaking, reading, writing and punctuation. They provide students with an understanding and appreciation of a culture other than their own. The language being studied is used in the classroom from the onset. Students acquire a working knowledge of essential grammatical structures and learn to speak and understand the language. Accurate and effective writing is a major goal, and serious full-length works are read beginning in the third year. Entering students may wish to continue studying a language begun at their previous schools. Placement will be determined by a test. Other students may begin a new language at this point in their education. To meet graduation requirements, students must complete the study of one language through the third-year course.

Course Descriptions - Spanish

■ Spanish 1 (1 year/1.0 unit)

Students with little or no previous exposure to Spanish are introduced to the basic elements of the language and to the cultures of the Spanish-speaking world. Emphasis is on basic language skills: listening, speaking, reading and writing. The ability to communicate in simple written and spoken Spanish is promoted through a variety of materials and activities.

Prerequisite: None. UC approved.

■ Spanish 2 (1 year/1.0 unit)

Students continue to study grammar and vocabulary, and emphasis is placed on written and oral expression using correct sentence structure. A study of the culture continues while students build the four language skills: listening, speaking, reading and writing.

Prerequisite: Spanish 1. UC approved.

■ Honors Spanish 2 (1 year/1.0 unit)

This course is an accelerated continuation of the first year of Spanish. It is designed to build at a quick pace and in greater depth on the vocabulary and concepts introduced in beginning Spanish courses. After the first day, the entire course is conducted in Spanish. Students will cultivate their speaking, listening, reading and writing skills. The course prepares students for the Spanish 3 Honors course.

Prerequisite: Spanish 1 and departmental approval. UC approved.

■ Spanish 3 (1 year/1.0 unit)

Spanish 3 is an intermediate level Spanish course designed to consolidate the concepts introduced in Spanish 1 and 2. Our theme-based curriculum offers students meaningful contexts to increase their Spanish vocabulary and to develop more complex grammar. Constant interaction in the target language and opportunities to write about topics of interest to teenagers help our students communicate more effectively in various time frames (present, past and future). Students learn about cultural elements of the Spanish-speaking world through the readings, songs, television programs, video clips and films analyzed in class. They also do formal oral presentations related to products, practices and perspectives in Spanish-speaking cultures.

Prerequisite: Spanish 2. UC approved.

■ Honors Spanish 3 (1 year/1.0 unit)

Honors Spanish 3 is an accelerated intermediate-level course designed to help students to acquire a greater proficiency in the language at a pace that is appropriate to their ability. Students who reach this level have the necessary linguistic resources to understand spoken Spanish at a normal pace, as well as to communicate with others with a degree of fluency, accuracy and spontaneity that enable regular interactions with native speakers. Students deliver organized presentations on subjects that might require research in addition to writing on general-interest topics, events and experiences with various time references. They understand the main idea and most supporting details

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

in stories and descriptions presented in a variety of genres. Students explore various aspects of Hispanic history and culture. Finally, this course prepares students to take the AP Spanish Language and Culture course the following year.

Prerequisite: Honors Spanish 2 and departmental approval. UC approved.

■ Spanish 4: Advanced Conversation and Composition (1 year/1.0 unit)

This is an intermediate/advanced Spanish course designed to help students develop further their previously acquired skills in Spanish. While students continue to review grammar, they move to a more advanced level of the language-learning process. They read, write and discuss more, and they do frequent oral presentations. They implement the grammar reviewed throughout the course to discuss the history, culture, art and literature of the Spanish-speaking world. Students will research and make presentations about specific historical, literary and cultural topics using the internet. The entire course is conducted in Spanish, and there are both written and oral evaluations.

Prerequisite: Spanish 3. UC approved.

■ Honors Spanish 4 (1 year/1 unit)

This is an accelerated Spanish course designed to strengthen further the language skills acquired through the intermediate levels of Spanish. All four language skills (speaking, writing, reading and listening) are rigorously trained through a full range of engaging and interactive activities. Basic grammar is reviewed to a degree, but there is a special emphasis on the more complex structures of the language. The development of topic vocabulary continues, but the course also ushers students into a more expansive acquisition of idiomatic expressions. Moreover, the course has a clearly defined cultural component, with an eye toward the AP Spanish Language and Culture course. Students study a good selection of cultural readings and do written and oral cultural comparisons in which they juxtapose particular cultural products, perspectives and practices of the Spanish-speaking world with those of the U.S. The course is conducted entirely in Spanish,

and students are required to communicate in the target language exclusively. Spanish 4 Honors serves as a pre-AP course for qualified students from the Spanish 3 regular course or any Spanish 3 honors students needing an additional year of linguistic fortification.

Prerequisite: Honors Spanish 3 or Spanish 3 with departmental approval. UC approved.

■ AP Spanish Language and Culture (1 year/1.0 unit)

This course is the standard AP Spanish Language course. Adhering to AP guidelines and through a variety of engaging and interactive methods, it focuses on the continued cultivation of students' language skills as well as a rich exploration of Spanish and Latin American culture. Students are expected to take the AP Spanish Language and Culture Examination in the spring.

Prerequisite: Honors Spanish 3, Honors Spanish 4, or Spanish 4 with department approval. UC approved.

■ AP Spanish Literature and Culture (1 year/1.0 unit)

This course is designed for students with advanced proficiency and interest in the language. They are exposed to a wide variety of genres and types of discourse, which will enable them to trace the history of Spanish prose, poetry and drama through some of its most important authors. The reading list is also intended to acquaint students with significant works that are considered masterpieces of world literature. Students are expected to take the AP Spanish Literature and Culture examination in the spring.

Prerequisite: AP Spanish Language and departmental approval. UC approved.

■ Honors Advanced Spanish: Literature and Film of the Spanish-Speaking World* (1 semester/0.5 unit)

This course is offered to students seeking to maintain and further develop their Spanish-language proficiency while delving into examples of quality literature and their corresponding cinematographic versions. Students will also view two to three Spanish or Latin American films independently and do presentations on these films following the guidelines given by the instructor.

* indicates a semester course

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

Conducted entirely in Spanish, the course is primarily discussion-based, but students will also act out scenes, participate in debates related to the works, and write analytical essays and creative pieces.

Prerequisite: Spanish 4, Spanish 4 Honors and AP Spanish Language and Culture. UC approved.

■ **Honors Advanced Spanish: The Latin American Short Story*** (1 semester/0.5 unit)

This course undergoes a study of the short story genre and, in so doing, exposes students to several classic examples of Latin American literature. We study the following writers: Jorge Luis Borges, Julio Cortázar, Juan Rulfo, Gabriel García Márquez and Isabel Allende. Studies of the themes and literary techniques of the works, as well as comparisons of the different authors, form the structure of our in-class discussions. Moreover, students will do in-class presentations and write analytical essays on these elements. Some creative writing by students and the viewing of related Spanish-language films are also integrated into the course. The course is conducted in Spanish.

Prerequisite: Spanish 4, Honors Spanish 4, or AP Spanish Language and Culture. UC approved.

■ **Contemporary Issues in the Spanish-Speaking World*** (1 semester/0.5 unit)

This course is offered to students having completed either Spanish 4 or AP Spanish Language, wishing to investigate and discuss contemporary issues and societal concerns. Topics will include conflicts of regional autonomy in Spain, immigration and relationships with the U.S., military dictatorships and revolutionary movements in Latin America, and economic, political and social conditions. Literature, periodicals, films, the Internet and TV programs provide the foundations for discussions and written assignments. Students will also have ample opportunity to develop further the four basic language skills: listening, speaking, reading and writing.

Prerequisite: Spanish 4: Advanced Conversation and Composition or AP Spanish Language. UC approved.

Course Descriptions - French

■ **French 1** (1 year/1.0 unit)

Students with little or no previous exposure to French are introduced to the basic elements of the language and to the culture of the French-speaking world. Emphasis is on basic language skills: listening, speaking, reading and writing. The ability to communicate in simple written and spoken French is promoted through a variety of materials and activities.

Prerequisite: None. UC approved.

■ **French 2** (1 year/1.0 unit)

Students continue to study grammar and vocabulary, and emphasis is placed on written and oral expression, using correct sentence structure. A study of the culture continues while students build the four language skills: listening, speaking, reading and writing.

Prerequisite: French 1. UC approved.

■ **French 3** (1 year/1.0 unit)

This course completes a review of the more complex aspects of French grammar. Active vocabulary and proficiency in listening, speaking and writing are developed through discussion, written exercises, compositions, and the reading of authentic materials from the Francophone world. The entire course is conducted in French.

Prerequisite: French 2 and departmental approval. UC approved.

■ **Honors French 3** (1 year/1.0 unit)

This is an accelerated, intermediate-level French course designed to review grammar at a quick pace with an emphasis on the more complex grammatical structures. The objective of the course is not only to review and build upon grammar and vocabulary, but also to guide students in incorporating the more idiomatic structures of the language into their speech and writing. All four language skills (speaking, writing, reading and listening) are trained through a full range of engaging and

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

interactive activities based on authentic materials. The course is conducted entirely in French and students are required to communicate in the target language. Upon satisfactory completion of this course, sophomores and juniors may opt to take the AP French Language and Culture course.

Prerequisite: French 2 and departmental approval. UC approved.

■ **French 4: Advanced Conversation and Composition (1 year/1.0 unit)**

French 4 is open to students who have successfully completed French 3. In this course, students work on advanced grammar and vocabulary in order to refine oral and written expression. Students will explore the history and culture through French films, using them as a springboard for class discussions, interactive activities, presentations, as well as written reflections. Students will use various authentic materials, including several full-length feature films, short videos and novels.

Prerequisite: French 3 or French 3 Honors and departmental approval. UC approved.

■ **Honors French 4 (1 year/1.0 unit)**

Honors French 4 is open to students who have successfully completed Honors French 3.

This is an accelerated course designed to review advanced grammar and a wide range of vocabulary with an emphasis on idiomatic structures. In order to develop all four language skills (speaking, writing, reading and listening) students will be exposed to a wide variety of authentic materials, including full-length feature films, short videos and novels. This rich and varied context will help provide models so that students can explore, improve their linguistic competence, and work towards being able to communicate effectively on a variety of aspects and themes of contemporary Francophone cultures from around the world. Upon satisfactory completion of this course, students may take the course in AP French Language.

■ **AP French Language and Culture (1 year/1.0 unit)**

This intensive course is designed to prepare students for the Advanced Placement French Language examination. It focuses on strengthening all four language skills, according to the AP guidelines. Readings and conversations on topics of current interest are used to advance the acquisition of vocabulary. The students are expected to take the AP French Language examination in the spring.

Prerequisite: Sophomores must have completed Honors French 4, and juniors or seniors must have completed French 3 Honors or French 4: Advanced Conversation and Composition and have departmental approval. UC approved.

■ **French Prose* (1 semester/0.5 unit)**

This course will expose students to a variety of prose texts, including short stories and novels of various authors from the medieval times to the 21st century. Students will read and analyze these texts focusing on plot, characterization, background and cultural information.

Prerequisite: French 4 or AP French. UC approved.

■ **French Literature & Film* (1 semester/0.5 unit)**

Perhaps more than any other nation, the French hold cinema in great esteem, both as an art form and popular entertainment. This course introduces works of literature, their film adaptations, and the associations between literary and cinemagraphic texts. Selections will be taken from popular literature as well as established literary tradition. Through these cultural texts, students will not only study basic aspects of literature and film but also different aspects of French culture while further developing their linguistic and critical thinking skills.

Prerequisite: French 4 or AP French. UC approved.

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

■ Honors Advanced Topics in French: Renaissance & Classical Literature (1 semester/0.5 unit)

This course is an introduction to the rich and varied corpus of French Literature of the early modern era (i.e., the Renaissance, Baroque and Classical periods). Through the study of these works, students will develop their ability to read, analyze and discuss both orally and in writing. This course provides the student with the opportunity to study college-level French literature following the model of the former AP French Literature course. The texts include plays, novels and poetry covering the 16th through 20th centuries.

Prerequisite: AP French Language. UC approved.

■ Honors Advanced Topics in French: Romantic & Modern Literature (1 semester/0.5 unit)

This course is an introduction to the rich and varied corpus of French literature from roughly the late Enlightenment to the modern era (i.e., the Romantic and Modern periods). Through the course, students will develop their ability to read, analyze and discuss both orally and in writing. This course provides the student with the opportunity to study college-level French literature following the model of the former AP French Literature course. The texts include plays, novels and poetry covering the 19th through 20th centuries.

Prerequisite: AP French Language. UC approved.

Course Descriptions - Japanese

■ Japanese 1 (1 year/1.0 unit)

This course will offer students with little or no previous exposure an introduction to the Japanese language. Through the course, students will acquire the basic four language skills (speaking, listening, reading and writing) as well as deepen their socio-cultural knowledge of Japan. By the end of the year, students will have learned to handle short, daily conversations in Japanese and read and write short essays that contain hiragana, katakana, and a small number of kanji characters.

Prerequisite: None. UC approved.

■ Japanese 2 (1 year/1.0 unit)

This course is designed to enhance the four language skills of listening, speaking, reading and writing introduced in Japanese 1. Students will learn about 70 additional kanji characters and read and write with increasing use of kanji. Students' language skills are further developed by the use of technology such as Web-based exercises, online testing resources, audio files and videos. By the end of the year, students should be able to create and comprehend essays and dialogues on familiar topics and personal interests. The study of Japanese culture will continue through a variety of activities and the use of audios, videotapes and technology.

Prerequisite: Japanese 1. UC approved.

■ Japanese 3 (1 year/1.0 unit)

Japanese 3 is a continuation of the study undertaken in Japanese 1 and 2. The course is designed to help students develop proficiency in both spoken and written Japanese, while they learn more advanced grammar patterns. Students will continue to develop their reading, writing, listening and speaking skills through a variety of methods. By the end of the year, students should have a broader acquaintance with modern Japanese life and culture through reading and discussing some essays, short stories and videos. They also learn a wide range of vocabulary and sentence

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

patterns so that they can express themselves more effectively, choosing the appropriate level of politeness. A situational and functional approach will expose students to many practical contexts in which they have to perform appropriate tasks. As for reading and writing, about 75 additional kanji characters will be introduced to the students during the course, and they will practice reading and writing longer passages, letters and essays. Cultural aspects are also introduced through reading, visual aids and the use of videos. Students who complete this class may continue on to Japanese 4.

Prerequisite: Japanese 2. UC approved.

■ Honors Japanese 3 (1 year/1.0 unit)

Japanese 3 Honors is the accelerated continuation of the study undertaken in Japanese 1 and 2. It is designed to review grammar and sentence patterns at a quick pace with an emphasis on the more complicated grammatical structures. Students who are entering this course are expected to have a very solid understanding of the previously introduced grammar and vocabulary. They will continue to develop proficiency in speaking, listening, reading and writing skills through a variety of methods with an emphasis on more advanced grammatical structures and honorific patterns. They will also learn another 80-90 kanji characters during the school year, and toward the end, they will be introduced to modern Japanese literature (essays, short stories and/or poems) and discuss in class how to better understand Japanese people and their culture.

Prerequisite: Japanese 2 and departmental approval. UC approved.

■ Japanese 4 (1 year/1.0 unit)

This course is designed for students who have successfully completed Japanese 3. Students will continue to develop proficiency in spoken and written Japanese by learning more advanced grammar patterns, the kanji writing system, and pragmatic skills with which they can communicate in the Japanese language more effectively in a variety of contexts. While learning the new material, the students are expected to acquire the oral and aural skills that enable them

to converse with people on familiar topics at a more natural speed. By the end of the year, students will have higher communicative skills in Japanese and a broader familiarity with modern Japanese life and culture through a variety of means such as readings, videos and discussions.

Prerequisite: Japanese 3 or Honors Japanese 3. UC approved.

■ Honors Japanese 4 (1 year/1.0 unit)

This accelerated course of Japanese 4 is designed for students who have successfully completed Honors Japanese 3. Students will continue to develop proficiency in spoken and written Japanese by learning more advanced grammar patterns, the kanji writing system, and pragmatic skills with which they can communicate in the Japanese language more effectively and appropriately in a variety of contexts. Students will have increased amount of in-class timed writing and reading exercises as well as speaking exercises (including formal presentations), and they are expected to learn to understand basic information from authentic materials such as advertisements and posters, as well as acquire the oral and aural skills that enable them to converse with people on familiar topics at a more natural speed. They will also learn to comprehend and interpret both written and spoken Japanese on a variety of topics and share information, opinions and ideas with each other. By the end of the year, students will have higher communicative skills in Japanese and a broader familiarity with modern Japanese life and culture through readings, videos and discussions. Students who complete this class are eligible to take AP Japanese the following year.

Prerequisite: Honors Japanese 3 or Japanese 3 with departmental approval. UC approved.

■ Japanese 5 (1 year/1.0 unit)

This course is designed for students who have successfully completed Japanese 4. Students will continue to work on more advanced vocabulary and grammar, and strengthen all language skills in speaking, listening, reading and writing in Japanese. A

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

variety of learning resources, including textbooks, films and short stories, and other authentic materials, will be used in this class; through language and cultural study, students will deepen their understanding of Japanese culture and become familiar with the customs and thoughts of the people of Japan. The course will be conducted mostly in the target language.

Prerequisite: Japanese 4. UC approved.

■ AP Japanese Language and Culture (1 year/1.0 unit)

This course is designed to prepare students for the AP Japanese Language and Culture examination. It focuses on strengthening the four skills of the Japanese language and cultural studies according to the National Standards for Japanese Language Learning and ACTFL Proficiency Guidelines. Students will be given extensive practice in various writing, reading and task-oriented oral and aural communication that take place in real-life situations, ultimately preparing them to effectively communicate with native speakers of Japanese. All students are required to take the AP Japanese Language and Culture examination in May.

Prerequisite: Honors Japanese 4 or Japanese 5 with departmental approval. UC approved.

■ Contemporary Japan (1 year/1.0 unit)

This is a yearlong language course designed to further develop students' ability to communicate and express themselves, enabling them to negotiate real life situations in Japanese. Students will learn an extensive amount of vocabulary and expressions commonly used in Japan as well as increase their understanding of social and cultural elements that are unique to the country while reviewing previously-studied grammar and refine their use of it. They will also deepen their understanding of current happenings in Japanese society and develop their ability to discuss such events in the target language, in written and oral form. The class is conducted entirely in Japanese with various authentic materials, discussions and hands-on activities.

Prerequisite: Honors Japanese 4 or Japanese 4 with department approval.

Course Descriptions - Latin

■ Latin 1 (1 year/1.0 unit)

Students with little or no prior experience in Latin are introduced to the basics of Latin. By reading fictionalized narratives of Roman families living in Pompeii, Britain and Egypt in the first century AD, students develop their comprehension of the Latin language and an understanding of the social and political history of the Romans. As students learn vocabulary, special attention is given to the study of English derivatives. All students are expected to take the National Latin Exam in the spring. Textbook: Cambridge Latin Course, units 1 & 2.

Prerequisite: None. UC approved.

■ Latin 2 (1 year/1.0 unit)

Students continue their study of basic Latin vocabulary, morphology and syntax as they read the ongoing fictionalized narrative begun in Latin 1. As they review past material and learn new grammar and syntax, students will continue to learn about the history and culture of the Romans, particularly as it pertains to the reading of the course, which are set in Rome and Roman Britain during the first century AD. All students are expected to take the National Latin Exam in the spring. Textbook: Cambridge Latin Course, unit 3.

Prerequisite: Latin 1. UC approved.

■ Latin 3 (1 year/1.0 unit)

In the first semester of this intermediate-level course, students complete the basic course of grammar and vocabulary as they finish reading the fictionalized narrative begun in unit 1. Thereafter, students will read a survey of Latin literature, both poetry and prose, beginning with texts that have been adapted for easier reading, but eventually working to unadapted passages. In this way, students will continue to strengthen their translation and comprehension skills while learning more about the history and culture of the Romans. All students are expected to take the National Latin Exam in the spring. Textbook: Cambridge Latin Course, unit 4.

Prerequisite: Latin 2. UC approved.

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

■ Honors Latin 3 (1 year/1.0 unit)

This course is an accelerated, intermediate-level course designed to review grammar and introduce new vocabulary at a rapid pace while focusing on more advanced and complex grammatical constructions. By reading a survey of unadapted Latin literature, both poetry and prose, students will broaden their knowledge of Roman authors and the various literary genres, as well as strengthen their ability to read and understand more complex Latin. All students are expected to take the National Latin Exam in the spring. Textbook: *Ecce Romani III*.

Prerequisite: Latin 2 and departmental approval. UC approved.

■ Latin 4: Advanced Study of Roman Prose and Poetry (1 year/1.0 unit)

This course provides an opportunity for students to continue to develop their ability to read complex, continuous Latin. Students will read from a variety of unadapted Latin literature, both poetry and prose, with the goal of reviewing advanced grammar, increasing their vocabulary, increasing their knowledge of Roman authors and the various literary genres, and preparing for AP Latin should they wish to enroll in Latin in the following year. All students are expected to take the National Latin Exam in the spring.

Prerequisite: Latin 3 or Honors Latin 3. UC approved.

■ AP Latin (1 year/1.0 unit)

This course is designed to prepare students for the College Board AP Latin Exam and to develop students' ability to read, translate and analyze Latin, both poetry and prose. Per AP guidelines, students will apply knowledge of context (political, historical, literary and cultural) to aid in comprehension; identify and analyze grammatical and stylistic features to determine the accurate and literal meaning; read aloud and employ scansion as an aid for reading comprehension; use contextual knowledge to help choose the most appropriate meaning for vocabulary; and understand and discuss a text in its correct literary, cultural political or historical context or framework. All students are expected to take both the National Latin Exam and the

AP Latin exam in the spring.

Prerequisite: Honors Latin 3 or Latin 4 and departmental approval. UC approved.

■ Honors Advanced Latin Literature: Epic* (1 semester/0.5 unit)

This course is designed for students who have completed the AP Latin course (Caesar and Vergil) and aims at providing these students with a survey course that will continue to allow these students to develop their translation skills and critical thinking skills, and excel in this subject area. This course includes a selected survey of Latin authors whose works represent the genre of epic poetry. This course may include (but not necessarily be limited to) works by Ennius, Lucretius, Catullus (carmen 64), Vergil, Ovid, and Lucan.

Prerequisite: Successful completion of AP Latin. UC approved.

■ Honors Advanced Latin Literature: Lyric Poetry* (1 semester/0.5 unit)

This course is designed for students who have completed the AP Latin course (Caesar and Vergil) and aims at providing these students with a survey course that will continue to allow these students to develop their translation skills and critical thinking skills, and excel in this subject area. This course includes a selected survey of Latin authors whose works represent the genre of lyric poetry, also known as love poetry. This course may include (but not necessarily be limited to) works by Catullus, Propertius, Tibullus and Ovid.

Prerequisite: Successful completion of AP Latin. UC approved.

■ Honors Advanced Latin Literature: Prose* (1 semester/0.5 unit)

This course includes a survey of prose representing selected works of authors of different genres such as history, epistles and philosophy. Possible authors whose work may be studied include Caesar, Livy, Cicero and Pliny. Students will be able to read, translate, understand, analyze and interpret the passages in the syllabus. Accurate translation, explication, contextual identification of texts, structural analysis and the ability

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

to recognize rhetorical techniques will be the skills students will acquire. Students will also study the historical and cultural settings of the texts.

Prerequisite: AP Latin. UC approved.

■ **Honors Advanced Latin Literature: Satire*** (1 semester/0.5 unit)

This course is designed for students who have completed the AP Latin course (Caesar and Vergil) and aims at providing these students with a survey course that will continue to allow these students to develop their translation skills and critical thinking skills, and excel in this subject area. This course includes a selected survey of Latin authors whose works represent the genre of satire. This course may include (but not necessarily be limited to) works by Juvenal, Horace, Martial, Petronius, Persius, Seneca and Quintilian.

Prerequisite: Successful completion of AP Latin. UC approved.

Course Descriptions - Chinese

■ **Mandarin 1** (1 year/1.0 unit)

This is a course for true beginners. By the end of the school year, students will have learned basic survival skills, such as greetings, introductions, asking directions and other real-life conversational situations. Speaking, understanding, reading and writing will all be integrated in a comprehensive text-based and multimedia program. Beginning with Pinyin as a foundation for correct pronunciation, we will move on to simplified Chinese characters, eventually adding traditional characters so that students can function in all settings. Grammar concepts are introduced in order of difficulty and continuously reinforced.

Prerequisite: None. UC approved.

■ **Mandarin 2** (1 year/1.0 unit)

Mandarin 2, equivalent to the second semester of a first-year college course, takes beginning students further along the road toward mastering the four skills of reading, writing, speaking and listening. The approach is performance-based, with an emphasis on student-centered communication activities. Students refine their pronunciation, especially tones, and greatly increase their vocabulary, both spoken and written. They will learn to ask directions, shop, make appointments, discuss the weather and a host of other real-to-life topics. The main text is supplemented with cultural information from movies, websites, magazines and other real-world materials. Students participate in a field trip to a Chinese restaurant in the local community, where they practice ordering in Mandarin.

Prerequisite: Mandarin 1. UC approved.

■ **Mandarin 3** (1 year/1.0 unit)

In this course, students continue to develop the four basic skills of speaking, listening, reading and writing, building upon vocabulary and grammar structures learned in previous years. They learn to write an additional 300 simplified characters and are introduced to the traditional forms of the characters they have

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

learned. The class is conducted almost entirely in Mandarin, with ample opportunities for students to engage in communicative activities in pairs and groups. Listening comprehension exercises from the textbook and multimedia software are supplemented with podcasts, short videos and clips from Chinese films. Students develop their writing skills, both by hand and on the computer, in a variety of formats and modes. Field trips, projects and holiday celebrations continue to supplement students' understanding of Chinese culture.

Prerequisite: Mandarin 2. UC approved.

■ Honors Mandarin 3 (1 year/1.0 unit)

This course is designed for highly motivated students who are prepared for more intensive study of Mandarin. Students continue to develop the four basic skills of speaking, listening, reading and writing, building upon vocabulary and grammar structures learned in previous years. They learn to write an additional 350 characters, and learn to recognize the traditional forms of the characters they have learned in both simplified and traditional forms. The class is conducted almost entirely in Mandarin, with ample opportunities for students to engage in communicative activities in pairs and groups. Listening and comprehension exercises focus on authentic materials such as podcasts, short videos and segments from Chinese films. Writing assignments in a variety of formats and modes challenge students to apply increasingly complex grammar, vocabulary and idioms. Students conduct intensive research projects on a variety of cultural topics which they present to the class. Fieldtrips and holiday celebrations continue to supplement students' understanding of Chinese culture.

Prerequisite: Mandarin 2 and departmental approval. UC approved.

■ Mandarin 4 (1 year/1.0 unit)

In this course, students focus on improving their communication skills in Mandarin. They further develop the four basic skills of speaking, listening, reading and writing, building upon vocabulary and

grammar structures learned in previous years' learning to write an additional 300 simplified characters, and learning to recognize the traditional forms of the characters they have learned. The class is conducted almost entirely in Mandarin, with a continuing emphasis on communicative activities in pairs and groups. Listening comprehension exercises drawn from podcasts, Chinese media and longer film clips expose students to a variety of authentic speakers and cultural products. Students further develop their writing skills, progressing to short essays in various genres. Field trips, projects and holiday celebrations continue to supplement students' understanding of Chinese culture.

Prerequisite: Mandarin 3 or Honors Mandarin 3. UC approved.

■ Honors Mandarin 4 (1 year/1.0 unit)

In this challenging course, students focus on improving their communication skills in Mandarin, in preparation for AP Chinese. They further develop the four basic skills of speaking, listening, reading and writing, building upon vocabulary and grammar structures learned in previous years, learning to write an additional 350 simplified characters, and learning to recognize the traditional forms of the characters they have learned. The class is conducted almost entirely in Mandarin, with a continuing emphasis on communicative activities in pairs and groups. Listening comprehension exercises drawn from podcasts, Chinese media and longer film clips expose students to a variety of authentic speakers and cultural products. Students further develop their writing skills, writing short essays in various genres. Chinese culture becomes a focus, via research and projects, community outings and holiday celebrations.

Prerequisite: Honors Mandarin 3 or Mandarin 3 with departmental approval. UC approved.

■ AP Chinese Language and Culture (1 year/1.0 unit)

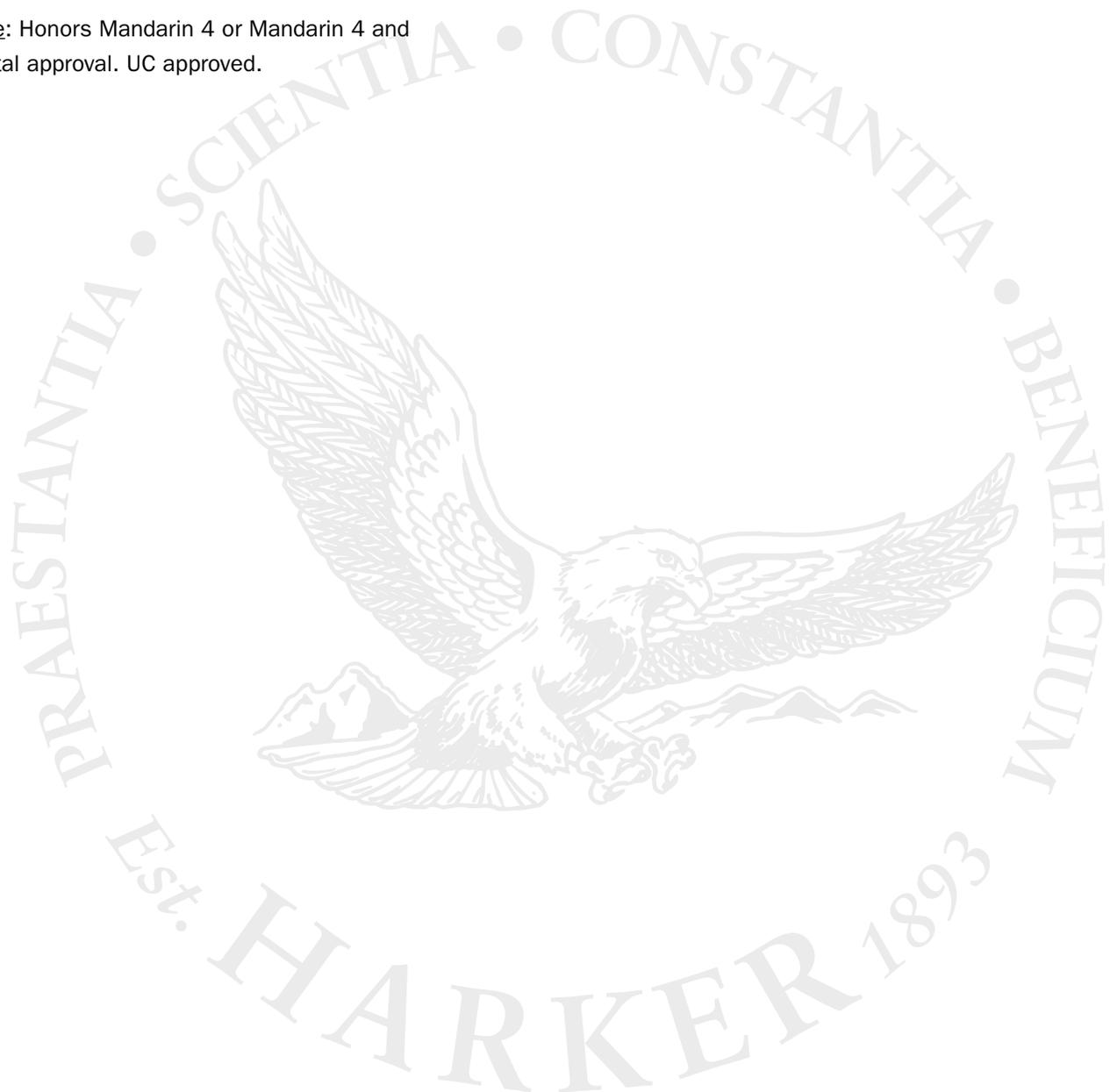
This class, roughly equivalent to a fourth-semester college course, continues the intensive pace of Mandarin 3 Honors and is designed to prepare students for the AP Chinese Language and Culture exam. The class is conducted mainly in Mandarin, and

The Harker School – Upper School Course of Study

Modern and Classical Languages, cont.

students are expected to perform to a high standard to remain in the class. Communicative exercises, Chinese films and other media, and extended presentations on a variety of cultural topics help students develop solid communicative skills in all modes. In a variety of writing assignments, students are challenged to make use of increasing complex grammar structures, sophisticated vocabulary and a growing repertoire of idioms. Students learn an additional 300 characters in both simplified and traditional forms, although they may chose to write in either form. Culturally rich reading assignments derived from authentic texts supplement the basic textbook.

Prerequisite: Honors Mandarin 4 or Mandarin 4 and departmental approval. UC approved.



The Harker School – Upper School Course of Study



Physical Education

Physical education is an important aspect of a total education. A healthy human being should develop mind, body and spirit. Some form of daily physical activity should become part of each person's life in order to promote health and develop fitness. We offer opportunities for decision-making and confidence-building while learning fair play and teamwork. We hope to have students develop an appreciation for their own talents and the talents of others. Students may fulfill the physical education requirement through election of programs in noncompetitive athletic endeavors, competitive team sports or through a traditional physical education program. Students may also choose to elect a combination of the above programs. The 0.5 units for the semester activity listed below count toward the two P.E. credits required to graduate. P.E. classes are not graded and are therefore not included on student transcripts.

Competitive Sports

Baseball

Open to boys only; offered in spring.

Students who wish to play baseball at a competitive level may be eligible for this activity. Students will receive instruction in fundamentals and proper baseball techniques and strategies. Students will compete against other schools in the California Interscholastic Federation.

■ Boys Baseball (1 season/0.5 unit)

Prerequisite: Open to grades 9-12 students by tryout.

Basketball

Open to boys and girls; offered in winter.

Students who wish to play competitive basketball may be eligible for these teams. Teams compete with high schools in the local league. Practices stress strengthening and polishing basic skills, learning offenses and defenses, and sharpening reactions to tactical situations.

■ Boys Basketball (1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

■ Girls Basketball (1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

Cheerleading

Open to all students, grade 9-12; offered in fall and winter.

In modern cheerleading, each athlete is expected to give his or her all to the team. It combines traditional cheerleading with dance and tumbling moves. The team cheers at a variety of events including school rallies as well as home and away football and basketball games. The squad prides itself on showing school spirit while exhibiting excellence in academics and athleticism.

Cross Country

Open to boys and girls; offered in fall.

Grade 9-12 students who are interested in competitive cross country events may try out for these teams. Cross country develops the stamina and speed necessary to race the three-mile distance. Beginners are welcome to join the team; the training runs are adjusted to suit each runner's ability. Teams are available for boys and girls.

■ Boys Cross Country (1 season/0.5 unit)

■ Girls Cross Country (1 season/0.5 unit)

Prerequisite: None.

The Harker School – Upper School Course of Study

Physical Education, cont.

Football

Open to boys and girls; offered in fall.

Students who are interested in competitive play may try out for this team. The football program offers instruction in fundamentals and proper football techniques. This program is competitive and involves a high level of skill and an emphasis on football strategies.

■ **JV Football**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-11 students by tryout.

■ **Varsity Football**
(1 season/0.5 unit)

Prerequisite: Open to grade 10-12 students by tryout.

Golf

Open to boys in the spring, girls in the fall.

Students who are interested in competitive play may try out for these teams. Participation and practice take place at golf driving ranges and local golf courses and country clubs. Participants provide their own clubs. Competitions are arranged with leagues.

■ **Boys Golf**
(1 season/0.5 unit)

■ **Girls Golf**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

Lacrosse

Open to girls; offered in spring.

Students who are interested in competitive play may try out for this team. The lacrosse program offers instruction in fundamentals and proper lacrosse technique.

■ **Girls Lacrosse**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 girls by tryout.

Soccer

Open to boys and girls; offered in winter.

Interested students may try out for these teams. This activity is geared towards serious, competitive play. The emphasis is on participation and healthy competition. Students will compete against other schools in the California Interscholastic Federation.

■ **Boys Soccer**
(1 season/0.5 unit)

■ **Girls Soccer**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

Softball

Open to girls only; offered in spring.

Girls who wish to play competitive softball may be eligible for this team. The students will receive instruction in fundamental and proper softball techniques and strategies. Students will compete in the California Interscholastic Federation.

■ **Girls Softball**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 girls by tryout.

Swimming

Open to boys and girls; offered in spring.

Students who are interested in competitive swimming may try out for these teams. Swimming is offered to both girls and boys, with or without competitive experience. Emphasis will be on stroke technique, race strategies and training.

■ **Boys Swimming**
(1 season/0.5 unit)

■ **Girls Swimming**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

The Harker School – Upper School Course of Study

Physical Education, cont.

Tennis

Open to boys and girls. Boys offered in spring; girls offered in fall.

Students who are interested in competitive tennis may try out for these teams. Harker fields both boys' and girls' teams in interscholastic tennis. Play includes both singles and doubles matches against local public and private schools.

- **Boys Tennis**
(1 season/0.5 unit)

- **Girls Tennis**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

Track and Field

Open to boys and girls; offered in spring.

Emphasis is on running technique for sprints, distance and hurdles. Field events include high jump, long jump, triple jump, shot put and discus.

- **Boys Track and Field**
(1 season/0.5 unit)

- **Girls Track and Field**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

Volleyball

Open to boys and girls; boys offered in spring; girls offered in fall.

Practices are designed to improve team play and individual skills and consist of high-level drills. Volleyball teams play a competitive interscholastic schedule against other private and public schools.

- **Boys Volleyball**
(1 season/0.5 unit)

- **Girls Volleyball**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

Water Polo

Open to boys and girls; boys offered in spring, girls offered in fall.

Students who wish to play competitive water polo may be eligible for this team. The students will receive instruction in fundamental and proper water polo techniques and strategies. Students will compete in the California Interscholastic Federation.

- **Boys Water Polo**
(1 season/0.5 unit)

- **Girls Water Polo**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

Wrestling

Open to boys and girls; offered in winter.

This program focuses on the development of proper wrestling techniques. Practices include an appropriate conditioning schedule, and team members compete in appropriate weight classes against other schools.

- **Boys Wrestling**
(1 season/0.5 unit)

- **Girls Wrestling**
(1 season/0.5 unit)

Prerequisite: Open to grade 9-12 students by tryout.

The Harker School – Upper School Course of Study

Physical Education, cont.

Noncompetitive Sports

All noncompetitive sports offerings are subject to sufficient student demand and faculty availability.

Capoeira

(1 semester/0.5 unit)

Capoeira is an Afro-Brazilian martial art which combines self defense, dance and music. Capoeira increases flexibility, coordination, strength, balance and self-confidence. Capoeira possesses a very unique style that brings together beauty and power, developing mental balance, physical conditioning, self defense, music and a profound sense of art. Capoeira can be done by anyone of any age or size. No athletic skill is required to participate.

Prerequisite: None.

■ Personal Fitness*

(1 semester/0.5 unit)

The goal of the personal fitness class is to target the components of fitness which include cardio-respiratory endurance, muscular endurance, muscular strength, and flexibility. Students learn how to develop a well-rounded workout routine that integrates resistance training, cardiovascular workouts, mobility work, balance training and more. Students will gain experience, proficiency and confidence in the execution of a wide variety of exercises and activities. This class is appropriate for students with little or no fitness or strength training experience. Offered during the school day.

Prerequisite: None.

■ Yoga*

(1 semester/0.5 unit)

This class will consist of one hour of Iyengar-style yoga asanas (physical poses). This style of yoga develops flexibility, strength, balance and endurance. Other benefits include stress reduction, improved energy, back and neck pain relief and relief of mental strain from studying. Students will be required to do an hour of yoga on their own each week and will write about it in a yoga journal, due at the end of the semester.

Prerequisite: None. Noncompetitive Sports

Academic Courses in Physical Education

These sequential courses are offered for academic credit, will earn a grade, and will be recorded on student transcripts.

Kinesiology and Sports Medicine 1*

(1 semester/0.5 unit)

This class will combine course work with practical hands-on skills to introduce students to topics such as exercise physiology, biomechanics, and the prevention and care of athletic injuries. Students will study basic musculoskeletal anatomy and function as it applies to human performance as well as dysfunction. Prevention, recognition and treatment strategies of common athletic injuries will be discussed. Students will also earn certification in First Aid/CPR/AED.

This course is designed for students interested in health care professions including athletic training, physical or occupational therapy, medicine, exercise physiology, as well as those interested in athletics, coaching, or the science behind physical activity.

UC approved.

Kinesiology and Sports Medicine 2*

(1 semester/0.5 unit)

This course will continue to build on concepts discussed in Kinesiology and Sports Medicine 1. Emphasis will be placed on the recognition and treatment of common athletic injuries for the spine and upper extremities. More advanced taping and injury prevention techniques will be taught and practiced. Other topics of study include sports nutrition, sport psychology and concussion.

UC approved.

The Harker School – Upper School Course of Study



Science

Today's increasingly technical world demands that ordinary people have a good knowledge of scientific principles in order to function well as responsible citizens. Harker's program provides a very strong background in science for every student. For those who plan careers in science or technology, the program is designed to provide maximum opportunity for advanced placement studies or elective opportunities in the sciences. All science courses stress problem-solving and laboratory experience. The research program provides support for students to engage in individualized scientific research.

Course Descriptions

Required Courses - Grade 9

All students are required to take either Physics or Honors Physics. The science department offers two courses in physics, both of which satisfy the graduation requirement.

■ Physics (1 year/1.0 unit)

This introductory physics course includes studies in motion, forces, optics, sound, electricity, magnetism, waves and nuclear physics. The emphasis is conceptual rather than mathematical. Lab activities and demonstrations are a major component of the course. Students will use computers for data collection, analysis and simulation. This course does not prepare students for the SAT Subject Test in physics.

Prerequisite: None. UC approved.

■ Honors Physics (1 year/1.0 unit)

This course provides the tools necessary to make sense of the universe at its most basic level via conceptualization and rigorous problem-solving. Quantitative and qualitative analysis are developed through software analysis of data to construct mathematical models. Scientific literacy is promoted in order to help students make informed and responsible decisions in their lives.

Prerequisite: Concurrent enrollment in Honors Geometry or higher honors mathematics course and departmental approval. UC approved.

Required Courses - Grade 10

All students are required to take a chemistry course in their sophomore year. The science department offers three yearlong courses: Chemistry, Honors Chemistry and AP Chemistry. AP Chemistry is available to juniors and seniors who qualify and receive departmental approval. AP Chemistry is also available to sophomores who obtain departmental approval and successfully complete a summer course.

■ Chemistry (1 year/1.0 unit)

This course emphasizes both a conceptual and quantitative understanding of chemistry. Atomic theory, chemical bonding, acid-base behavior, oxidation-reduction and other kinds of reactions are studied. Students conduct many laboratory experiments to develop an understanding of chemical principles as related to everyday life.

Prerequisite: Physics or Honors Physics. UC approved.

■ Honors Chemistry (1 year/1.0 unit)

This course serves as an introduction to modern chemistry. Atomic structure, bonding, phase change, solutions, chemical reactions, thermodynamics, acid-base equilibria, kinetics and aspects of organic and inorganic chemistry are included. Emphasis is placed on developing problem-solving skills. This course incorporates lab work.

Prerequisite: Physics or Honors Physics and departmental approval. UC approved.

The Harker School – Upper School Course of Study

Science, cont.

Required Courses - Grade 11

All students are required to take a biology course in their junior year. AP Biology is available to juniors who obtain department approval and successfully complete a summer course.

■ **Biology** (1 year/1.0 unit)

This yearlong introductory lab science explores fundamental topics in biology. Students study cell structure, function and the basic processes of living things. A survey of the plant and animal kingdoms, human anatomy and physiology, ecology, evolution and genetics (both classical and molecular) are included.

Prerequisite: Chemistry, Honors Chemistry or AP Chemistry. UC approved.

■ **Honors Biology** (1 year/1.0 unit)

This course is designed for students who have a proven interest and ability in science. This yearlong course provides a detailed view of fundamental biological processes, cell structures and function, molecular and classical genetics, basic biochemistry, evolution, anatomy and physiology, and ecology.

Prerequisite: Chemistry, Honors Chemistry or AP Chemistry and departmental approval. UC approved.

Elective Classes

■ **AP Biology** (1 year/1.0 unit)

This yearlong lab course prepares students for the AP Biology examination as well as the SAT Subject Test in biology. Included in this course are biochemistry, cytology and cellular energy transformations, taxonomy, ecology and population dynamics and molecular genetics, heredity and evolution.

Prerequisite: Grade 11 - AP Biology is available to juniors who satisfy department requirements to take the course (from Honors Chemistry an A- or better for the first semester; from AP Chemistry a B+ or better for the first semester), obtain departmental approval and successfully complete a Harker summer course.

UC approved.

Grade 12 - A or better in Biology or B+ or better in Honors Biology and department approval. UC approved.

■ **AP Chemistry** (1 year/1.0 unit)

This course is the equivalent of an introductory college general chemistry course. We begin with a brief review of some basic topics in chemistry relating to the nature of atoms, molecules, ions, the concept of mole and stoichiometry. This is followed by a more in-depth discussion of the electronic structure of atoms, the nature of chemical bonding and how it relates to states of matter, thermochemistry, chemical kinetics, chemical equilibrium, thermodynamics and electrochemistry. We will also touch upon basic organic and nuclear chemistry. A major objective of this course is to understand basic principles and apply them towards solving comprehensive problems. The course is integrated with a rigorous laboratory program. Students who have completed this course will be prepared to take the AP Chemistry examination as well as the SAT Subject Test in chemistry.

Prerequisite: Grade 10 - AP Chemistry is available to sophomores who satisfy department requirements to take the course, earn an A or better in semester 1 of Honors Physics, obtain department approval and successfully complete a Harker summer course. UC approved.

Grade 11 & 12 - Honors Chemistry and departmental approval or Chemistry with course grade of "A" both semesters and departmental approval. (Students from Chemistry may not take both Honors Biology and AP Chemistry concurrently during junior year.). UC approved.

■ **AP Environmental Science** (1 year/1.0 unit)

AP Environmental Science is a lab-based senior elective. The class is interdisciplinary in nature, drawing on students' backgrounds in biology, chemistry and physics. Topics covered include earth systems and resources, the living world, population, land and water use, energy resources and consumption, pollution and global change. Students are prepared for the AP

The Harker School – Upper School Course of Study

Science, cont.

Environmental Science exam in the spring.

Prerequisite: Honors or AP Biology or a B+ or better in Biology and department approval. UC Approved.

■ AP Physics 2 (1 year/1.0 unit)

This course follows all directives as set by the College Board in their description of the AP Physics 2 course. This course continues the systematic introduction to the main principles of physics that began in the freshman physics course and emphasizes the development of conceptual understanding and problem-solving ability using algebra and trigonometry. The Physics 2 course includes topics in both classical and modern physics. Knowledge of algebra and basic trigonometry is required; the basic ideas of calculus may be introduced in the theoretical development of some physical concepts, such as acceleration and work. Understanding of the basic principles involved and the ability to apply these principles in the solution of problems is a major goal of the course, which serves as preparation for the AP Physics 2 exam.

Prerequisite: Students who completed Honors Physics with a B+ both semesters or Physics with an A both semesters, have concurrent enrollment in Honors Precalculus or higher level math course, and earn department approval are eligible for AP Physics 2. UC approved.

■ AP Physics C (1 year/1.0 unit)

This course follows all course directives as set by the College Board in their description of the AP Physics C course.

This yearlong, calculus-based physics course is composed of roughly one-half mechanics (including linear and rotational kinematics and dynamics) and one-half electricity and magnetism. Methods of calculus are used wherever appropriate in formulating physical principles and in applying them to physical problems. The sequence is more intensive and analytic than that in AP Physics 2. Strong emphasis is placed on solving a variety of challenging problems, some requiring calculus. After this course students will be able to take

the AP Physics C exam in either Mechanics or Electricity and Magnetism.

Prerequisite: AP Physics C is designed for students who have earned A- or higher grades in Honors Physics and have completed, or for seniors are enrolled in, AP Calculus BC. Department approval required. UC approved.

■ Honors Analytical Chemistry* (1 semester/0.5 unit)

Analytical Chemistry is to be taken after either the successful completion of Honors Chemistry or Advanced Placement Chemistry. The course is modeled after similar courses taught by college chemistry departments at either the sophomore or junior level. It will cover both fundamental and practical aspects of chemical analysis utilizing both classical and modern techniques drawn from many areas of science including but not limited to the following: life sciences, environmental chemistry, clinical chemistry and industrial analysis. The first portion of the course will emphasize traditional techniques including gravimetric analysis, titrimetric methods of analysis including precipitation, acid-base and complexes, as well as electrochemical methods. The second half of the course will focus on the use of instrumentation with emphasis placed on spectroscopy and chromatography. The entire course will be heavily experimentally oriented with the majority of the students' classroom time being spent in the chemistry laboratory.

Prerequisite: Honors or AP Chemistry and department approval. UC approved.

■ Astronomy* (1 semester/0.5 unit)

This one-semester elective course will give students a general overview of the fundamental principles of astronomy. Students learn about the history of astronomy and astronomical instrumentation. The observational component of the course covers constellations, the celestial sphere and the motions of heavenly bodies. A discussion of telescope types (optical, infrared, radio, X-ray and gamma ray) and uses will complement this section. The course then moves

The Harker School – Upper School Course of Study

Science, cont.

into light, spectra, stars, star formation and stellar evolution. A detailed look at the sun (the star we know best) will assist students in understanding the life cycle of stars. The demise of stars gives us such fascinating objects as white dwarfs, planetary nebula, supernovae, neutron stars, pulsars and black holes. The course culminates with the topic of galaxy formation and evolution, with a central focus on the details relating to the Milky Way, our galaxy.

Prerequisite: Physics or Honors Physics. UC approved.

■ **Biotechnology*** (1 semester/0.5 unit)

Biotechnology is the use of living organisms or their products to enhance our lives and our environment. The course is lab-based, providing students exposure to many of the basic techniques used in biotechnology today. Students will conduct novel research to improve our knowledge about the local environment. This course also examines fundamental issues of biotechnology, such as how it impacts the lives of humans, other animals, plants and the environment. We also look at ethical issues about the role of science and technology in our society.

Prerequisite: Completion of first semester of Biology, Honors Biology or AP Biology. UC approved.

■ **Electronics*** (1 semester/0.5 unit)

The primary objective of this course is to introduce the basic principles of electric circuits through experimentation and laboratory-based activities. The emphasis in the course will be on analog circuits with an introduction to digital electronics at the end of the semester. Specific objectives include:

- recognizing safe electrical hazards and practicing proper safety procedures in the laboratory;
- identifying components from a circuit diagram;
- constructing circuits from circuit diagrams;
- being able to decompose circuits into parallel and series networks and apply Thevenin's theorem to simplify circuits for analysis;
- being able to apply Kirchoff's Laws and Ohm's law to analyze a circuit;
- applying various mathematics modes to analyze

circuits including solving simultaneous equations, logarithms, exponentials and sinusoidal functions;

- making accurate electric measurements using a digital multimeter and oscilloscope;
- developing techniques for troubleshooting electric circuits;
- designing and building a complex circuit using various components and solderless breadboards;
- designing and building a complex circuit using the software Electronic Workbench.

Prerequisite: Physics or Honors Physics. UC approved.

■ **Evolution*** (1 semester/0.5 unit)

This course will help students to understand evolutionary biology as a simple idea and as a unifying concept for all of biology. The principles of evolutionary biology and the scientific argument for evolution as the source of diversity of life forms will be discussed. The course begins with an overview of the origins of evolutionary theory. We will then proceed through a series of discussions on the processes involved in the creation and maintenance of diversity, including human diversity. The course will consider societal impacts of evolution throughout the semester.

Prerequisite: Biology, Honors Biology or AP Biology. UC approved.

■ **Honors Human Anatomy and Physiology** (1 year/1.0 unit)

This yearlong lab course begins with a microscopic study of the cytology of tissues and then explores the physiology of the major systems of the human body. Laboratory work includes a systematic dissection of a cat, plus a study of other specimens. Current trends and research in the areas of nutrition, health and disease are discussed.

Prerequisite: A or better in Biology or B or better in Honors or AP Biology and department approval. UC approved.

The Harker School – Upper School Course of Study

Science, cont.

■ **Marine Biology*** (1 semester/0.5 unit)

This one-semester course explores the major concepts in ecology through an exploration of the Earth's ocean ecosystems. First, we explore the unique conditions in the ocean and implications for life living there. Then we investigate the distribution of the Earth's oceans, the major currents and the control and effect of tides. Next, we explore the various components of marine food webs, starting with phytoplankton and working our way up to fish, marine mammals and sea birds. The last part of the course includes a survey of the major ocean ecosystems and their unique features.

Prerequisite: Physics or Honors Physics. UC approved.

■ **Honors Nanoscience*** (1 semester/0.5 unit)

This course introduces students to the emerging field of nanoscale science and engineering (NSE), an area that is rapidly transforming the way we look at the properties of materials, and their applications in the real world. We begin with a broad overview on why the properties of nanomaterials differ from those of the corresponding bulk materials, how do we synthesize nanomaterials, and the need for new tools to see and manipulate objects that are so small. The second part of the course focuses on exploring the applications of nanoscience in medicine, energy and environment, technology, and the use of nanomaterials in everyday products. Students are encouraged to think with an interdisciplinary mindset by drawing on their knowledge of math, chemistry, physics and biology. Inquiry-based labs and visual tools are used extensively to explore various topics.

Prerequisite: Honors or AP Chemistry and department approval.

■ **Research Methods** (1 year/1.0 unit)

Research Methods is designed for students interested in conducting scientific research. Students have the opportunity to delve deeply into a topic of interest while participating in a community of fellow student-researchers. Elements of science history and modern

science issues are woven into the curriculum. After basic skill development, students design and conduct experiments to test their research questions and then analyze their results with statistical analyses. Students expand their communication skills with formal reports and presentations to the class. They may also participate in a larger research community at the local science fair and the Harker Research Symposium.

Prerequisite: Physics or Honors Physics and recommendation of the student's science and/or mathematics teacher. UC approved.

■ **Advanced Research** (1 semester/0.5 unit)

In Advanced Research, students have the option of continuing their research projects from the Research Methods course with additional experiments and/or more in-depth analyses. They also may pursue research in a different field altogether. Students who complete a research project over the summer or are ready to collect data on a project approved by the instructor may also enroll if they have enough experience to work independently. The course requires much independent work, but also incorporates peer review and mentoring of less experienced research students. Advanced Research may be taken for credit more than once. With instructor approval, students may enroll in an honors version of the course. Honors students are held to a higher standard of writing quality and are expected to incorporate original procedures and/or analysis into their projects. Honors students also take on additional mentoring duties with students in the Research Methods course.

Prerequisite: Research Methods or instructor approval. Typically, instructor approval requires satisfactory completion of a summer research internship equivalent to a full-time summer position.

■ **The Science of Food*** (1 semester/0.5 unit)

This course will explore a variety of topics related to the science of food including: the chemistry and nutrition of carbohydrates, fats and proteins; the chemistry and importance of the various vitamins, minerals and

The Harker School – Upper School Course of Study

Science, cont.

phytochemicals in our diets; the use of food substitutes and additives to various food products; the role of microorganisms in the production of various foods such as bread and yogurt and how these microbes alter the chemistry of important foods; and the chemical changes that take place in foods during cooking and baking. We will be spending significant time both in the lab and in the kitchen, conducting experiments and investigating the impact of cooking and baking on different foods.

Prerequisite: Chemistry, Honors Chemistry or AP Chemistry. UC approved.

■ Seminar in Modern Physics* (1 semester/0.5 unit)

The discoveries and the methods of analysis that are the basis of 20th-century physics have dominated our lives and in many cases set the tone of our intellectual debate. Discoveries from quantum mechanics are the basis for all the current work in the development of modern materials and in modern electronics devices such as transistors. Using a conceptual approach this course covers special and general relativity, the quantization of energy, particle-wave duality, the four fundamental forces, and the latest theories regarding the fundamental building blocks of nature.

Prerequisite: Physics or Honors Physics. UC approved.

■ Study of Organic Chemistry* (1 semester/0.5 unit)

This course introduces students to the fundamentals of organic chemistry and its application to everyday life and biological processes. The chemistry of carbon is explored in the context of functional groups, nomenclature, properties and reaction mechanisms. The goal is to get students familiar with structures and bonding in organic compounds, so they can succeed in introductory college organic/biochemistry courses. In addition, students are introduced to a variety of experimental techniques that are commonly employed in the synthesis and purification of organic compounds.

Prerequisite: Chemistry, Honors Chemistry or AP Chemistry and departmental approval. UC approved.

The Harker School – Upper School Course of Study



Speech and Debate

The speech and debate department provides students with a breadth of opportunities in debate (policy, congressional, public forum and Lincoln-Douglas formats) and individual speech events. The lifelong value of written and oral communication skills are emphasized within an environment that encourages students to participate in local, regional and national tournament competitions. There is an emphasis on critical thinking, research, argumentation and presentation. Travel fees apply for tournament competitions.

Course Descriptions

■ Introduction to Speech and Debate (1 year/0.5 unit)

Introduction to Speech and Debate provides students with an introduction to public speaking and argumentation through practical application. Students will work on presentation, research, critical writing and argumentation skills. Students will select a primary event to focus on in preparation for tournament competition. The department offers policy, Lincoln-Douglas, congressional and public forum debate, in addition to a variety of individual speaking events. Evaluation is based on classwork and in-class participation. This course requires no previous experience. If a student has taken a speech or debate class but does not have significant prior tournament competition experience in one of the high school level events, this class is a better fit than our intermediate course. Because this is an Extra Period Option course, students may take this introductory course in addition to their full academic loads.

The course carries one-half credit for a full year of participation.

Prerequisite: None

■ Intermediate Speech and Debate (1 year/0.5 unit)

Students enrolled in one of these courses below have had significant prior tournament competition experience in the event chosen. Students will focus on building communication skills and preparing for tournaments by developing persuasive speeches, researching, performing interpretations of literature or building extemporaneous speaking skills. Evaluation is based on classwork, homework and in-class participation. Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half

credit for a full year of participation.

Prerequisite: Department approval

- Intermediate Speech and Debate: Lincoln-Douglas
- Intermediate Speech and Debate: Individual Events
- Intermediate Speech and Debate: Public Forum
- Intermediate Speech and Debate: Congressional Debate
- Intermediate Speech and Debate: Policy Debate
- Competitive Speech and Debate (1 year/not for credit)
Students involved in the competitive speech and debate program are required to enroll in one of these non-credit, Extra Period Option classes.
Prerequisite: Introduction or Intermediate Speech and Debate
- Competitive Speech and Debate: Congressional Debate
- Competitive Speech and Debate: Individual Events
- Competitive Speech and Debate: Policy Debate
- Competitive Speech and Debate: Lincoln-Douglas Debate
- Competitive Speech and Debate: Public Forum Debate

The Harker School – Upper School Course of Study



Visual and Performing Arts

The visual and performing arts department provides students with an understanding of the value of arts in culture by giving them a balanced exposure to and appreciation of the arts. Dance, theater arts, music and visual arts are offered in an environment where students can discover and nurture their artistic affinities and creative potential. Students are provided a forum in which to demonstrate their ability via productions and art displays, thus enriching both Harker and the community. Costume and/or material fees may apply for some performing arts classes.

Conservatory

Students especially interested in the performing arts may apply for participation in the Harker Conservatory Certificate program in one of the following areas: dance, instrumental music, vocal music, acting, musical theater or technical theater. To receive the certificate, students engage in a rigorous four-year program; they are guided through a comprehensive course of study in all of the performing arts, with special emphasis in the discipline of the student's choice. Program requirements include courses and workshops in disciplines other than the student's emphasis, involvement in productions/ensembles/festivals, sophomore juries and through live performance critiques in a variety of genres, including dramas, musicals and concerts. The program culminates in the senior year with a final presentation to the faculty advisory panel and a formal performance of pieces from the student's portfolio, accompanied by the presentation of the Certificate. Most Conservatory requirements do not appear on the transcript.

Course Descriptions

Required Classes

All students must complete one full year of an artistic class, normally in the freshman year. Courses which satisfy this requirement are Study of Dance, Study of Theater Arts, Study of Music, Study of Visual Arts and AP Art History. AP Art History is open to sophomores, juniors and seniors. Students who plan to take this course to satisfy the requirement should choose other electives in the freshman year. Students must elect one of these yearlong courses to satisfy the requirement.

■ Study of Dance (1 year/1.0 unit)

A study of dance builds problem-solving and creative thinking skills. As students focus on perceiving, comprehending, imagining and evaluating, they develop strong interpretive, analytical and critical thinking skills. By learning to make choices within structure, dance students learn to develop individual and group solutions to complex problems. Dance

curricula provide many opportunities for students to articulate complex problems and to practice divergent and nonlinear thinking in order to generate solutions. The process of exploring the art of dance allows students to develop their communication skills and acquire new symbolic literacy. Students will also develop dance skills, choreography knowledge and a historical perspective of dance. Note that Study of Dance is an academic course and, unlike the after-school dance courses, it does not satisfy the P.E. requirement.

Prerequisite: None. UC approved.

■ Study of Music (1 year/1.0 unit)

In this course the language of music is examined, including musical symbols and notation, the tonalities of different musical instruments, harmonization, arrangement and composition. The history of music is explored through listening, reading assignments, class discussion and written work. An appreciation of music from various cultures is fostered. The historical, cultural and personal

The Harker School – Upper School Course of Study

Visual and Performing Arts, cont.

circumstances surrounding the creation of famous musical works is also discussed.

Prerequisite: None. UC approved.

■ Study of Theater Arts (1 year/1.0 unit)

This course gives students an understanding of theater as it exists today and provides a common vocabulary covering all aspects of modern stage performance, production and history. Through individual exploration, group discussion and practical experience, students will examine the forces throughout history that have shaped the evolution of acting, directing, technical theater and musical theater. By examining theater from many regions and styles, students gain an appreciation of the skills employed by theater artists today and those artists whose works endure.

Prerequisite: None. UC approved.

■ Study of Visual Arts (1 year/1.0 unit)

This survey of art history focuses on artistic contributions produced in the past as a foundation for an exploration and understanding of contemporary art. Students explore the relationship of visual sensibilities and the artistic process as seen in Asian, African, Egyptian, Greek, French and Spanish art. Through lectures and related hands-on projects, they explore the development of art as a worldwide expression of life issues.

Prerequisite: None. UC approved.

■ AP Art History (1 year/1.0 unit)

Intended to prepare students for the AP examination in art history, the course is a survey of world art from pre-history to the present with a strong emphasis on Western art. Students will develop a vocabulary while studying all major forms of artistic expression including painting, sculpture and architecture within diverse historical and cultural contexts. Image identification, critical analysis and evaluation of both context and aesthetics are emphasized.

Prerequisite: World History 1 or World History 1 Honors and departmental approval. UC approved.

Performing Arts Electives

■ Advanced Acting* (1 semester/0.5 unit)

This continues the study of acting developed in Study of Theater Arts. Using dramatic and comedic monologues as a backdrop, students learn to make specific acting choices and create dynamic, strong characters. By videotaping their work regularly, students learn to analyze their work and make adjustments. Monologues will be performed both for a student audience and taken to a festival for adjudication. Students also design their resumes for future auditions.

Prerequisite: Study of Theater Arts and/or departmental approval. UC approved.

■ Scene Study* - Advanced Scene Study* (1 semester/0.5 unit) - Vocal Interpretation* (1 semester/0.5 unit) - Shakespeare in Performance* (1 semester/0.5 unit)

Designed for advanced acting students, Advanced Scene Study, Vocal Interpretation, and Shakespeare in Performance give students the ability to sharpen their stage sensibilities and make sophisticated acting choices. Students work on specific acting techniques, performing Shakespearean, dramatic, comedic or musical scenes from their favorite works in class and at acting festivals. During the semester, students also have the opportunity to present a lecture on a specific school of acting, such as Uta Hagen or Stella Adler. These classes are offered in rotation each semester; check the schedule of classes for details.

Prerequisite: Previous stage experience, Advanced Acting and departmental approval. UC approved.

■ Student-Directed Showcase* (1 semester/0.5 unit)

This class is offered to selected seniors, who are given the rare opportunity to direct Conservatory students

The Harker School – Upper School Course of Study

Visual and Performing Arts, cont.

in a series of one-act plays performed in January for the Harker and outside communities. Students follow a rigorous curriculum as they study the art of directing and ultimately apply their skills to a fully produced production. An application and interview process is required. No more than four students are admitted based upon their experience and application.

Prerequisite: Advanced Scene Study, Advanced Acting and/or departmental approval. UC approved.

■ **Acting for the Camera*** **(1 semester/0.5 unit)**

Acting for the Camera is a comprehensive, step-by-step course designed to develop the skills necessary for film, television and commercial work. Throughout the semester, scenes are developed for character analysis and then blocked for camera shots. Students are exposed to and fully utilize the specific techniques required in acting for film, television and commercial work, from learning how to block for camera to developing appropriate acting techniques for the medium.

■ **Technical Theater*** **(1 semester/0.5 unit)**

Harker students work on all aspects of technical production, from construction and painting to stage management, running crew, load-in and strike. This program is as intensive and hands-on as the student chooses, providing outlets for those simply wanting to work on a single show to those seeking preparation of portfolios for college applications. Our technical theater students provide support for all major productions on campus, and often enrich special programs and events with their technical expertise, such as the winter ball and spirit rallies. Technicians also participate in theater arts festivals. This technical theater course is taught one semester each year for those interested in a deeper study of stage management, lighting design and general production.

Prerequisite: None. UC approved.

■ **Music Fundamentals *** **(1 semester/0.5 unit)**

Music Fundamentals covers the basics of Western music notation including sight signing and ear training. This class is not a substitute for Study of Music.

■ **AP Music Theory** **(1 year/1.0 unit)**

This class is designed to encourage students to discover the meaning of music, by developing their aural, sight-singing, compositional and analytical skills. Basic rudiments are reviewed first, including notation, intervals, scales and keys, chords, metric organization and rhythmic patterns. Students then develop their compositional skills by the creation of two- and four-voice counterpoint. The other major component is analytical, including motivic treatment and harmonic analysis, functional triadic harmony, tonal relationships, modulation and phrase structure.

Prerequisite: Diagnostic test and departmental approval. Study of Music strongly recommended. UC approved.

■ **Bel Canto** **(1 year/0.5 unit)**

A blend of traditional chorus and training ground, Bel Canto explores choral technique and music theory, and many musical genres, including African-American spirituals, traditional Latin, modern choral, non-English folk songs, pop and jazz music. Students may remain in Bel Canto multiple years, taking advantage of the changing repertoire and varied genres in order to maximize their choral music education and prepare them for whatever type of ensemble they will choose in college or as an adult. Others participate in Bel Canto a year or two before choosing to specialize by requesting Camerata or auditioning for Cantilena or Downbeat, and indeed a year in Bel Canto is required before joining one of these other groups.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation.

Prerequisite: None.

The Harker School – Upper School Course of Study

Visual and Performing Arts, cont.

■ **Camerata** (1 year/0.5 unit)

Camerata is Harker's mixed, classical choral chamber ensemble, performing essential works from all eras in various languages. Students solidify their knowledge of vocal and choral technique to create a unified, balanced and nuanced choral sound.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation.

Prerequisite: Bel Canto, departmental approval and exam proficiency. UC approved.

■ **Cantilena** (1 year/0.5 unit)

Known in the region for their consistently high marks in festivals in performance and sight reading, Cantilena is Harker's "all-classical-all-the-time" women's chamber ensemble. The ensemble sings challenging literature of diverse genres and cultures ranging from medieval chant to experimental 21st-century works. Cantilena tours to Europe regularly. Those auditioning will demonstrate competency in music reading, tonal memory and basic vocal technique.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation.

Prerequisite: Bel Canto or director's approval. UC approved.

■ **Downbeat** (1 year/0.5 unit)

Sophomores, juniors and seniors who are looking for a smaller, more select show ensemble may audition for Downbeat. This group is very theatrical, incorporating dance and vocal interpretation into jazz and pop songs which emphasize close vocal harmony. Downbeat is often featured at exclusive Harker events. The discipline and techniques taught in Downbeat excellently prepare the singers for all aspects of musical life; our performers have gone on to be cast

in operas, musicals and exclusive a cappella singing groups on their college campuses, and report that their training in Downbeat makes them among the most advanced musicians in their groups. As a prerequisite, students must participate in Bel Canto for one year and be able to read music and have moderate dance skills. Members of Downbeat must be in weekly voice lessons and take regular jazz dance class.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation. Additionally, students in Downbeat earn 0.5 P.E. credit for the full year of participation.

Prerequisite: Bel Canto, Cantilena or Camerata. By audition only for grades 10-12. UC approved.

■ **JV and Varsity Dance Troupes** (1 year/0.5 unit)

The JV and varsity dance troupes are by audition only; selection for troupe membership is based upon the dancers' physical, technical and artistic skills as well as their commitment to a yearlong program of dance study. Stylistic emphasis is on ballet, jazz and modern dance, and the troupes are featured at the annual family picnic, homecoming and other Harker events. The annual dance production highlights the talents of the troupes with their original choreography as the focus. Students graduating from this program have gone on to dance in college, citing confidence and skills which enable them to have a competitive edge in college dance programs. As a prerequisite, students must have dance experience and outside studio training.

Because JV and Varsity Dance Troupe are Extra Period Option courses, students may take Troupe in addition to their full academic loads. Troupe dancers earn 1.5 P.E. credits for the full year of participation.

Prerequisite: JV and Varsity are by audition only. Auditions are in the spring of every year.

The Harker School – Upper School Course of Study

Visual and Performing Arts, cont.

■ **Dance Composition*** (1 semester/0.5 unit)

Dance composition provides the basic fundamentals and theories for choreography so that students have the tools needed to successfully choreograph a movement piece.

■ **Performance Practice for Dancers *** (1 semester/0.5 unit)

Performance Practice for Dancers provides a deeper and more thorough exploration of modern choreographers, their movement and technique methods (Humphrey, Graham, Horton, Limon) to expand upon what has been learned in prior classes. This class helps students to prepare and practice solos for college auditions/competitions and hone skills in students' particular dance style (jazz, tap, ballet, contemporary, hip-hop, etc.).

■ **Choreography*** (1 semester/0.5 unit)

Choreography is designed for students who wish to learn how to compose choreography for an ensemble performance. Students will develop their own choreographic styles and voices through broadening and expanding their own movement and choreography vocabularies. The course introduces the basic principles of choreography including inspiration, space and time, dynamics, structure and form, and theme and variation. It offers the opportunity to create dance phrases and motifs with instructor and peer critique, ultimately leading to casting, costuming and designing a full-length ensemble piece to be performed, upon approval, in the Conservatory's annual dance production.

This course will incorporate learning how to construct group and individual movements, improvisations, creating and performing movement phrases, discussion and peer reviews/evaluations, and critical analysis of professional and local dance performances. Students will also learn organizational methods, and experiment with technological advances in the fields of dance and performing arts.

Prerequisite: Completion of Dance Composition AND application submission the previous spring.

■ **Lab Band** (1 year/0.5 unit)

The Harker Lab Band is an introductory jazz ensemble dedicated to learning the art of large jazz ensemble performance and improvisation. This ensemble is open to all students in grade 9 and those students in grades 10, 11 and 12 who are new to learning jazz. Students who play sax, trumpet, trombone, bass (upright), keyboard, guitar and drums are welcome. The lab band has various performances throughout the year, including the family picnic, homecoming and the Evening of Jazz concert. Yearlong commitment. Open to all grades.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries 0.5 credit for a full year of participation.

Prerequisite: None.

■ **Jazz Band** (1 year/0.5 unit)

The Harker Jazz Band comprises students in grades 10, 11 and 12 who already have experience studying and performing jazz. Classes consist of daily rehearsals, lessons in improvisation and performances of well-known and modern jazz arrangements. Students who play sax, trumpet, trombone, bass (upright), keyboard, guitar and drums are welcome. The jazz band has various performances throughout the year, including CMEA festivals and the Evening of Jazz concert. Yearlong commitment.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries 0.5 credit for a full year of participation.

Prerequisite: Lab Band or instructor consent.

■ **Orchestra** (1 year/0.5 unit)

The Harker Orchestra plays a wide variety of musical styles from the great masters of classical music to the

The Harker School – Upper School Course of Study

Visual and Performing Arts, cont.

cutting edge of contemporary sounds. Opportunities exist for musicians to participate in smaller chamber groups or to perform as soloists.

Members of the orchestra are often selected by the school to perform in chamber ensembles at special events both on and off campus. In 2006 the orchestra toured Paris, and in 2011, by invitation from the City of Westminster, they participated in London's New Year's 2012 festival. Performances throughout the year include a holiday tour, CMEA festivals and graduation. Yearlong commitment. Open to all grades.

Because this is an Extra Period Option course, students may take this course in addition to their full academic loads. The course carries one-half credit for a full year of participation.

Prerequisite: Some auditions may be required for various instruments.

■ **Performance Practice for Instrumentalists*** (1 semester/0.5 unit)

Performance practice can be defined as “the way in which music is performed, especially as it relates to the quest for the ‘authentic’ style of performing the music of previous generations and eras” (Oxford Music). This course addresses performance issues for students as they pertain to the Baroque (1600-1750), Classical (1750-1825) and Romantic (1825-1900) periods in western music. Students will learn the different styles through text, online resources and multimedia as well as guest lecturers. Daily classes consist of lecture, discussion and performance. Specific topics to be studied will include phrasing, expression, articulation, rhythm, rubato, tuning and more. Students must be at an intermediate level of ability on any instrument that was written for in these time periods. These include, but are not limited to, piano, guitar, flute, violin, horn, oboe, cello, viola, bassoon, French horn, etc.

Prerequisite: Open to any student with an intermediate proficiency or higher on any given musical instrument. In some cases, pre-screening and/or department approval may be required.

Visual Arts Electives

■ **Architecture*** (1 semester/0.5 unit)

Students are introduced to the basics of architecture with emphasis on creative exploration of concepts such as structure, form, function, scale, color and spatial relationship. The course utilizes a hands-on design studio concept. A review of architectural traditions is conducted. Students study the psychological, social, cultural and historical aspects of architecture through slides and lectures. Visiting architects, building tours and architectural office visits supplement the design studio.

Prerequisite: Departmental approval. UC approved.

■ **Ceramics*** (1 semester/0.5 unit)

In this studio class, students explore the elements of three-dimensional art through hand building techniques in clay to create functional pottery as well as sculptural works. A variety of ceramic techniques are presented including pinch, coil and slab construction, extruded forms, and the potter's wheel. Various glazing and textural techniques in clay are also presented. Students will also learn about some of the major achievements in ceramics in various cultures and the ceramic sculpture created by contemporary artists. A research project on a ceramic artist or style and an in-class presentation of the student's research (including visuals) are required for this course.

Prerequisite: None.

■ **Advanced Ceramics*** (1 semester/0.5 unit)

In this advanced course, students build upon the technical aspects of constructing forms with clay to further develop and refine their skills. Advanced projects such as creating figurative sculpture in ceramics as well as the exploration of abstract forms, experimentation with successive glazing techniques, and clay construction on a larger scale are emphasized.

Prerequisite: Ceramics and departmental approval. UC approved.

The Harker School – Upper School Course of Study

Visual and Performing Arts, cont.

■ **Drawing***

(1 semester/0.5 unit)

This studio class is devoted to the art of drawing from life. The class emphasizes the development of observational drawing skills in black and white media including graphite pencil, charcoal, conte crayon, and pen & ink. Students create a portfolio of drawings that explore techniques such as contour line, value, contrast, shading, texture, blending, perspective, human figure proportions and composition. Through drawing activities such as rendering still lifes, figure studies and architectural rendering students gain personal insight and technical proficiency into the process of drawing realistically. A quarterly art review of a local museum or gallery exhibition is also a class requirement.

Prerequisite: None.

■ **Advanced Drawing***

(1 semester/0.5 unit)

In this advanced class, students build upon the drawing skills developed in the introductory course and begin experimenting with more expressive forms of drawing. Students address more advanced drawing topics including expressive mark, distortion, scale, color harmonies, color blending and mixing media using chalk and oil pastel, color pencil, charcoal, pen & ink and watercolor. Students are encouraged to develop their own visual ideas, subject matter and personal expressions to expand their aesthetic skills in drawing. A quarterly art review of a local museum or gallery exhibition is also a class requirement.

Prerequisite: Drawing and departmental approval. UC approved.

■ **Graphic Arts***

(1 semester/0.5 unit)

In this course students will focus on building a fundamental platform for understanding how to communicate visually. Through a series of projects rooted in the history of graphic design, students will study composition, color, typography, and digital drawing concepts. The outcome of this course will be a student's increased understanding of both how to create visual works and understand visual

communication as a cultural tool.

Prerequisite: None. UC approved.

■ **Advanced Graphic Arts***

(1 semester/0.5 unit)

This course focuses on computer-based imaging as an expressive tool. Combining digital illustration, typography and digital photography, students will create complex works that will create an understanding of digital platforms as an evolving art-making strategy, as well as prepare students for their application in a professional environment.

Prerequisite: Graphic Arts. UC approved.

■ **Painting***

(1 semester/0.5 unit)

This class is a foundation course in the art of painting in the water-based media of acrylic and watercolor. The study of color theory and composition in painting is an essential component of the course. Painting techniques relevant to each medium will be presented such as color mixing, blending, wet-on-wet, wet-on-dry, gradients and expressive brush technique. Students will paint from observation as well as experiment with abstract approaches to painting. Paintings will be developed from still-life arrangements, landscape, figure, collage and stencil compositions. A quarterly art review of a local museum or gallery exhibition is also a class requirement.

Prerequisite: None.

■ **Advanced Painting***

(1 semester/0.5 unit)

In this advanced class, students build upon the painting skills developed in the introductory course and begin investigating new concepts, techniques and approaches to painting in oil. The course addresses more advanced painting topics including creating a series of paintings based on a theme, concept or art theory. Students are encouraged to develop their own visual ideas, subject matter and personal expressions to expand their aesthetic skills in painting. A quarterly art review of a local museum or gallery exhibition is also a class requirement.

Prerequisite: Painting and departmental approval. UC approved.

The Harker School – Upper School Course of Study

Visual and Performing Arts, cont.

■ Photography*

(1 semester/0.5 unit)

This course provides students with an introduction to visual concepts, basic image capture, and camera functions with digital cameras. Students work through a series of creative projects that provide a strong foundation in the hardware, software and techniques associated with digital photographic imaging. The goal of this class is to inform a student's understanding of his or her role as an image creator in a culture saturated with images. The course will require some time outside of class for shooting.

Prerequisite: None.

■ Advanced Photography*

(1 semester/0.5 unit)

Advanced Photography will build on the knowledge and skills introduced in beginning Photography to deepen students' understandings of seeing photographically. Through a series of projects based on photographic concepts, students will refine their understanding of a color-managed workflow as well as investigate the application of photography as a cultural language. Projects will prepare students for further study in the AP 2-D design portfolio as well as provide an extensive foundation for further study at the college level.

Prerequisite: Photography

■ Sculpture*

(1 semester/0.5 unit)

In this course, students encounter a range of different approaches to sculpture. They will learn to work with malleable, subtractive and constructive materials. This class will study four different aspects of sculpture: malleable materials like clay, wax, plastilina, etc.; subtractive materials like wood, stone, alabaster, etc.; constructive materials like metal, cardboard, foamcore, etc.; and casting techniques for bronze, cast iron, etc. At the end of the course, each student will have a sculpture cast in bronze.

Prerequisite: None.

■ Advanced Sculpture*

(1 semester/0.5 unit)

This course builds on the skills and insights the students acquired in the sculpture class. The students are encouraged to develop and explore ideas that intrigue them on a personal level. The students will learn how to express these ideas using a variety of materials and techniques, emphasizing the development of a broad portfolio. This course will provide the students with the skills needed in case they plan to take the AP Studio Art 3-D course.

Prerequisite: Sculpture. UC approved.

■ Stone Carving*

(1 semester/0.5 unit)

This is a studio class where students learn about the process of working in a subtractive material like stone. They will develop the skills to design, carve and polish a sculpture in marble or alabaster. The students will learn to carve by hand as well as with the use of pneumatic hammers and dremels.

Prerequisite: None.

■ Advanced Stone Carving*

(1 semester/0.5 unit)

In this studio class students further develop their talents and refine the skills learned in Stone Carving. Advanced projects will be planned and developed on an individual basis in consultation with the faculty.

Prerequisite: Stone Carving and departmental approval. UC approved.

■ Filmmaking*

(1 semester/0.5 unit)

Students will study the art and technology of time-based media. Scripting and storyboarding, camera techniques, lighting, sound and editing will be applied by students in planning and structuring their own productions. This class will focus on building a foundation for filmmaking as well as a lens for students to interrogate the omnipresence of video in their daily lives. Frequent discussions on the power and role of media in society encourage students to explore the meaning and

The Harker School – Upper School Course of Study

Visual and Performing Arts, cont.

significance of the moving image.

Prerequisite: Photography or department approval.

■ AP Studio Art (Drawing, 2-D and 3-D) (1 year/1.0 unit)

This is an advanced studio class for students preparing to submit an AP portfolio in May. Students may choose to concentrate in 2-D design, 3-D design or drawing.

The entire department works closely with the students in this class on an individual basis to help them develop their artistic skills and talents and guide the preparation of the AP portfolio. Students interested in the course should speak with the department early in the academic year prior to which they intend to take the class in order to ensure adequate preparation.

Prerequisite: Coursework in the chosen area of concentration and departmental approval. UC approved.

■ Honors Art: Directed Portfolio* (1 semester/0.5 unit)

For the rare student who has completed AP Studio Art prior to senior year, this course provides an opportunity for a senior to stretch the artistic mind and eye in a chosen medium with direction and mentorship.

Prerequisite: Completion of AP Studio Art and department approval. UC approved.



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