DON BOSCO TECHNICAL INSTITUTE

COURSE CATALOG

Last revised 2/18/2025

2024-2025 DON BOSCO TECHNICAL INSTITUTE COURSE CATALOG
ACADEMIC EDUCATION COURSES

(A/B course number extensions designate first (A) or second (B) semester.
These letters appear on transcripts only for summer term classes)
(AP = Advanced Placement)

ENGLISH

EN101 A/B ENGLISH 1,2 (Composition and Literature)
(Full Year, College preparatory, UC-B, 5 high school units per semester)
Students taking this course will read literature from a variety of genres, including the novel, drama, and poetry. These readings will serve as a basis of discussion as well as written expression. The focus of composition in this course is the improvement of written communication skills with emphasis on sentence structure and paragraph development. An emphasis on identifying logical fallacies in rhetoric will also be taught. The student will learn to address formal essay prompts, examination essays, and informal response statements.

EN101H A/B HONORS ENGLISH 1,2 (Honors Composition and Literature)
(Full Year, College preparatory, UC-B, DBTI Honors course, 5 high school units per semester)
English 101 Honors encompasses various literary genres (mythology, novels, plays, poems, short stories, and other media), and the development of a multi-paragraph essay. This class refines reading and reading comprehension skills. Furthermore, it molds grammar, punctuation, vocabulary, writing, speaking, PSAT, and critical thinking skills. Archetypes and mythology set the foundation for coursework, and for the next four years at Bosco Tech. Projects are an application & extension of themes found in the novel. By the end of English I: students should be thoroughly conversant in the identification and analysis of literary terms, literary elements, and the ability to write a multi-paragraph essay.

EN201 A/B ENGLISH 3,4 (Composition and Literature)
(Full Year, College preparatory, UC-B, 5 high school units per semester)
The major theme of study is growth and change in adolescent development. Through fiction and non-fiction readings, short stories, and essays about and by young people, students will discuss major factors that aid or hinder young people's growth into ~~young~~ adults. Students will, in turn, reflect upon and evaluate their own lives and growth processes. During the year, students will explore composition through short writings, timed writings, and process~~ed~~ essays. The final product will be the creation of an autobiography.

EN201H A/B HONORS ENGLISH 3,4 (Honors Composition and Literature)
(Full Year, College preparatory, UC-B, UC Honors course, 5 high school units per semester)
English 201 Honors continues the critical analysis of various literary genres and the composition of a multi-paragraph essay. Thematic focus is on adolescent development. The composition foci are thesis statements, concrete details, and insightful commentary. The opportunity to prepare for the following year's college applications comes through the study of memoir & the creation of an extended autobiographical essay . It further cultivates grammar, punctuation, vocabulary, writing, speaking, PSAT; and critical thinking skills. Students will strengthen their skills in identification & analysis of literary terms, writing multi-paragraph and autobiographical essays (in accordance with MLA formatting guidelines), and writing extemporaneously in timed situations.

EN301 A/B ENGLISH 5,6 (American Literature)

(Full Year, College preparatory, UC-B, 5 high school units per semester)

This course introduces students to American Literature, focusing on our literary tradition from early Colonial writing to contemporary texts. Students will engage the material, critically reading for archetypes, overarching themes, and parallels between the text and current issues in society, emphasizing analysis and interpretation within the many genres and movements of literature. Students will write open-ended, argument, and literary analysis essays to articulate their point(s) of view and contribute to the discussion on American Literature.

EN307 A/B AP LANGUAGE AND COMPOSITION

(Full Year, College preparatory, UC-B, UC Honors course, 5 high school units per semester)

AP Language and Composition is an introductory college-level composition course. Students cultivate their understanding of writing and rhetorical arguments through reading, analyzing, and writing texts as they explore topics like rhetorical situations, claims and evidence, reasoning and organization, and style.

EN400 A/B SPEECH AND FORENSICS

(Full Year, College preparatory, UC-B, 5 high school units per semester)

This course introduces all aspects of effective public speaking including verbal and non-verbal considerations such as tone, diction, command and connection with the audience. Students will deliver various types of messages in front of groups.

EN402 A/B ENGLISH 7,8 (British Literature)

(Full Year, College preparatory, UC-B, 5 high school units per semester)

The focus of this course is the preparation of students for college writing and reading. Students will be introduced to composition and research techniques, culminating in diverse writing prompts of argument, rhetoric, and persuasion. Students will also engage in the study of and the evaluation and analysis of British Literature, primarily in the form of discussion and writing. The course material will foster the student's appreciation and understanding of British Literature and familiarize the student with genres and movements within British literature, as well as historical events and people that impacted British literature.

EN407 A/B AP COMPOSITION AND LITERATURE

(Full Year, College preparatory, UC-B, UC Honors course, 5 high school units per semester)

The focus of the AP course is the study of British and American literature from various time periods. The course is designed to help the student advance in his ability to write clear, concise formal academic essays and to analyze and apply critical theory to literature. This prepares the students for the AP exam in May and for future college composition courses. Students are required to take the AP exam in May.

FINE ARTS

FA201 A/B VISUAL ARTS (Art Appreciation)

(Full Year, College preparatory, UC-F, 5 high school units per semester)

This course provides students with an introduction to the visual arts, including: an exploration of the nature, processes, and materials of art; a study of elements and principles of design through an examination of two and three-dimensional artworks; and a survey of the world's art—in cultural context—from the prehistoric to the present. Students will have the opportunity to create and evaluate

their own artworks based on an informed understanding of the aesthetics, design, and various styles of art. -- Beginning Level

FA202 A/B INTRODUCTION TO MUSIC (Music Appreciation)

(Full Year, College preparatory, UC-F, 5 high school units per semester)

This course provides students with an introduction to music through the study of music theory, musical styles, periods, and forms. With the instructor's assistance, students will select an instrument to study, and be given instruction in understanding, manipulating, and playing it proficiently. The student develops an understanding and appreciation of artistic expression and the ability to discuss and write with discrimination about the musical literature studied. Extra practices and performances are mandatory. -- Beginning Level

HE103 A/B MARCHING BAND

(5 high school units, this class may be used to meet the DBTI diploma requirements for physical education)

This course develops student's musical skills through appropriate techniques specific to a marching band, including: reading musical notation accurately, performing musical exercises and written music with good tone quality, and discriminating between various marching styles. Students are provided opportunities to develop the skills necessary to function as team members and discover methods for attaining ensemble success. Students will become public representatives of Don Bosco Technical Institute at school events, competitions and at various school and community activities. Extra practices and performances are mandatory. Advanced Level—Fall Semester

FA203 A/B JAZZ ENSEMBLE

(Full Year, College preparatory, UC-F, 5 high school units per semester)

This course addresses the fundamental concepts of Jazz performance and theory. Through focused study on traditional Jazz instruments, students will learn improvisational techniques, lead-sheet reading, arranging, articulation, and styles appropriate to the Jazz idiom. Students develop the ability to perform on an instrument with accurate skill and technique, analyze a musical work, and apply it to their playing, artistically express musical ideas, and develop understanding for the historical importance and function of Jazz in society. Extra practices and performances are mandatory. Advanced Level—Spring Semester

FA208 A/B SYMPHONIC BAND

(Full Year, College preparatory, UC-F, 5 high school units per semester)

This course provides exposure to classical concert literature and other musical forms. Through focused study on traditional wind instruments, students will analyze scores and apply proper technique, balance, tone, theory, structure, and timber specific to the art form. The students will develop the ability to perform, improve ensemble playing, understand historical relevance, develop critical thinking as it applies to the score, and discover methods for attaining ensemble success. Extra practices and performances are mandatory. Advanced Level—Spring Semester

WORLD LANGUAGES (LOTE)

FL102 A/B SPANISH I (1,2)

(Full Year, College preparatory, UC-E, 5 high school units per semester)

This course is a study of the fundamentals of the Spanish language with an emphasis on the ability to understand, speak, read and write elementary Spanish. Students are also provided with an introduction to the cultures of Spanish-speaking nations.

FL104 A/B BILINGUAL SPANISH I (1,2)

(Full Year, College preparatory, UC-E, 5 high school units per semester)

Conducted in Spanish, this course is designed to develop necessary skills in grammar, spelling, writing, vocabulary, and sentence structure. Students develop skills in oral communication and reading comprehension of Spanish, and are given an introduction to the different cultures of Spanish-speaking nations, and their literature.

FL105 A/B JAPANESE I (1,2)

(Full Year, College preparatory, UC-E, 5 high school units per semester)

This course provides students opportunities in which the basic skills of listening, speaking, reading and writing Japanese are practiced. Emphasis is placed on students attaining listening skills and oral language experiences to acquire essential Japanese language survival skills.

FL202 A/B SPANISH II (3,4)

(Full Year, College preparatory, UC-E, 5 high school units per semester)

This course is a review of basic Spanish. It advances the skills students were introduced to in Spanish I (1,2) with an emphasis on oral, reading and writing expression and a more detailed study of the cultures of Spanish-speaking peoples.

FL204 A/B BILINGUAL SPANISH II (3,4)

(Full Year, College preparatory, UC-E, 5 high school units per semester)

In this course, a continued emphasis is placed on the student's understanding of the parts of speech, punctuation, capitalization and proper usage of Spanish. The course includes further study of Spanish-American literature and the cultures of Spanish-speaking nations. This course also serves as a preparation for AP Spanish language exam if students decide to take it (with teacher recommendation).

FL205 A/B JAPANESE II (3,4)

(Full Year, College preparatory, UC-E, 5 high school units per semester)

This course builds on the previous learning of the Japanese language students gained in Japanese I (1, 2). It expands and advances the use of grammar and sentence structure so as to allow students to carry on conversations about basic topics in daily life. In addition, students will be further immersed in Japanese culture and society.

FL302 A/B SPANISH III (5,6)

(Full Year, College preparatory, UC-E, 5 high school units per semester)

This course is a review and advancement of skills students were introduced to in Spanish II (3,4) with an increased emphasis on oral, reading and writing expression. Further in-depth study of the cultures of Spanish-speaking people, and an introduction to selected Spanish writers are emphasized.

FL304 A/B AP SPANISH LANGUAGE AND CULTURE

(Full Year, College preparatory, UC-E, UC Honors course, 5 high school units per semester)

This course is a comprehensive review of the Spanish language as well as a preparation for the AP test. The course is designed as a college equivalency course for students, and the expected work level is paralleled to the skill of a third-year college-level student in composition and conversation. Students are required to take the AP exam in May.

FL305 A/B JAPANESE III (5,6)

(Full Year, College preparatory, UC-E, 5 high school units per semester)

This course provides a review and advancement of skills that students were introduced to the previous learning of the Japanese language (1, 2, 3 and 4). It expands and advances the use of grammar and sentence structures for various topics. Students will be further immersed in Japanese culture and society; communication is especially emphasized.

FL401 A/B AP SPANISH LITERATURE AND CULTURE

(Full Year, College preparatory, UC-E, UC Honors course, 5 high school units per semester)

This course covers the equivalent of a college-level course in Spanish Literature and Culture. Students will focus on the reading, writing and understanding of the literature (poems, stories, novels, short stories, drama and other genres), and the cultures of the various Spanish-speaking societies that produced them. This course is a preparation for the AP Spanish Literature exam, which all students are required to take.

HEALTH AND PHYSICAL EDUCATION

HE110 A/B HEALTHY LIVING

(Full Year, College preparatory, 10 high school units)

Healthy Living is an integrated course of Health and Physical Education. This is a year-long course that will consist of the student partaking in physical activity, as well as attending classroom sessions for the health portion of the class. Students will learn proper stretching and cool-down techniques, as well as participating in competitive drills, weight lifting, and sports. The classroom portion will educate the students on such topics as introductory anatomy and physiology, self-esteem, stress, mental disorders, family relationships, food and nutrition, alcohol, drugs, tobacco, diseases, and sexual education.

HE103 A/B MARCHING BAND

(5 high school units, this class may be used to meet the DBTI diploma requirements for physical education)

This course develops student's musical skills through appropriate techniques specific to a marching band, including: reading musical notation accurately, performing musical exercises and written music with good tone quality, and discriminating between various marching styles. Students are provided opportunities to develop the skills necessary to function as team members and discover methods for attaining ensemble success. Students will become public representatives of Don Bosco Technical Institute at school events, competitions and at various school and community activities. Extra practices and performances are mandatory. Advanced Level—Fall Semester

MATHEMATICS

MA111 A/B INTEGRATED MATH I

(Full Year, College preparatory, UC-C, 5 high school units per semester)

Integrated Mathematics I A/B is a first year, college preparatory mathematics course that serves as both a graduation and California state requirement. The fundamental math skill sets, stemming from both Algebra and Geometry, are vital to success in both the short and long term. A study of expressions, equations, and functions; solving and graphing linear equations, functions, and inequalities; writing linear equations; systems of linear equations and inequalities; exponents and exponential functions; radicals and geometry connections; rational equations and functions; parallel and perpendicular lines; congruent triangles; quadrilaterals. This course will prepare students for Integrated Mathematics II A/B.

MA211 A/B INTEGRATED MATH II

(Full Year, College preparatory, UC-C, 5 high school units per semester)

Integrated Mathematics II is the second course of a three-course sequence including MA111, MA211, and MA311. Topics include study of quadratic expressions, functions, equations and relations; exponential and logarithmic functions and relations; concepts of formal proof, exploring the properties of two-and three-dimensional objects, working within the rectangular coordinate system to verify geometric relationships, and proving basic theorems about circles. Students also use the language of set theory to compute and interpret probabilities for compound events, and trigonometric basic tools for analyzing and measuring right triangles, acute and obtuse triangles, and complex shapes.

MA311 A/B INTEGRATED MATH III

(Full Year, College preparatory, UC-C, 5 high school units per semester)

Integrated Math III is the third course of a three-course sequence including MA111, MA211, and MA311. Topics include content standards from Algebra 1, Geometry, Algebra 2 and Statistics at an intermediate to advanced level including coordinate geometry, circles and other conic sections, binomial distributions, permutations and combinations, exponential and logarithmic functions, rates of change, derivatives, trigonometry and quadratics. Students will examine polynomial functions, exponents and logs, trigonometric functions (equations and applications), triangle trigonometry (laws of sine and cosine), trigonometric addition formulas, and solving trigonometric equations. Students will continue by examining analytic geometry, polar coordinates, geometric representation of complex numbers, powers of complex numbers, roots of complex numbers, vectors and determinants, sequences, series, limits and iterated functions, and introduction to calculus, including finding derivatives of curves, using derivatives in curve sketching, extreme value problems, and velocity and acceleration.

MA303 A/B PRECALCULUS 1,2

(Full Year, College preparatory, UC-C, 5 high school units per semester)

This exploration of functions is designed to better prepare students for college-level calculus and provide grounding for other advanced STEM courses and careers. Throughout this course, students study a wide variety of functions, including their algebraic manipulations, graphs, and applications. The topics covered in this course are polynomial and rational functions; exponential and logarithmic functions; trigonometric functions; analytic trigonometry; applications of trigonometry; linear systems and matrices; probability and counting techniques; analytic geometry; limits and an introduction to calculus.

MA401 A/B CALCULUS 1,2

(Full Year, College preparatory, UC-C, 5 high school units per semester)

Functions, graphs and limits; derivatives of algebraic, trigonometric, inverse trigonometric, exponential and logarithmic functions; applications of the derivative to include maxima and minima, points of inflection, concavity, related rates, the differential and linear approximation; integrals; properties of the

definite integral; substitution method of integration; applications of integration to areas and solids of revolution; differential equations with separable variables, slope fields.

MA403 A/B STATISTICS 1,2

(Full Year, College preparatory, UC-C, 5 high school units per semester)

A study of how to collect, organize, analyze and interpret numerical information from data through the understanding of random samples; experimental design; organization of data such as frequency distributions and histograms; measures of central tendency; measures of variation; percentiles and box and whisker plots; scatter diagrams and linear correlation; linear regression and coefficient determination; elementary probability theory; binomial probability distribution; normal curves and sampling distributions; estimation of a population; hypothesis testing; tests involving paired differences; inferences about the difference of two means and two proportions; inferences using the chi-square distribution; inferences relating to linear regression.

MA406 A/B AP CALCULUS AB

(Full Year, College preparatory, UC-C, UC Honors course, 5 high school units per semester)

AP Calculus AB is designed to be the equivalent of a first-semester college calculus course devoted to topics in differential and integral calculus. Starting with foundational materials such as functions, graphs and limits, the course then moves on to study derivatives of a wide variety of functions, including algebraic, trigonometric, inverse trigonometric, exponential and logarithmic functions. Derivatives are applied to finding maxima and minima, points of inflection, and concavity, as well as solving problems of optimization, related rates, and both differential and linear approximations. A wide variety of methods are taught for solving both integral, as well as their applications to areas and solids of revolution, differential equations with separable variables, and slope fields. The courses feature a multi-representational approach to calculus, with concepts, results, and problems expressed graphically, numerically, analytically, and verbally. Students are required to take the AP examination in May.

MA407 A/B AP CALCULUS BC

(Full Year, College preparatory, UC-C, UC Honors course, 5 units per semester)

AP Calculus BC is designed to be equivalent to both first and second-semester college calculus courses. AP Calculus BC applies the content and skills learned in AP Calculus AB to parametrically defined curves, polar curves, and vector-valued functions; develops additional integration techniques and applications; and introduces the topics of sequences and series. Exploring connections among these representations builds an understanding of how calculus applies limits to develop important ideas, definitions, formulas, and theorems. Students are required to take the AP examination in May.

MA408 A/B AP STATISTICS

(Full Year, College preparatory, UC-C, UC Honors course, 5 high school units per semester)

The AP Statistics course is equivalent to a one-semester, introductory, non-calculus-based college course in statistics. The course introduces students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. There are four themes in the AP Statistics course: exploring data, sampling and experimentation, anticipating patterns, and statistical inference. Students use technology, investigations, problem solving, and writing as they build conceptual understanding.

SCIENCE

SC203 A/B BIOLOGY 1,2

(Full Year, College preparatory, UC-D, 5 high school units per semester)
This college preparatory course is designed to introduce students to the fundamentals of biology including cell biology, genetics, molecular biology, evolution, and ecology. Students focus on understanding and applying the material and on grasping big picture concepts. Emphasis is placed on cultivating critical thinking, problem-solving skills, and effective study habits throughout the course, in order to reinforce students' abilities to grasp complex concepts and to retain and apply knowledge. By the end of this course, students have a foundation which they can develop as they continue their science education.

SC203H A/B HONORS BIOLOGY 1,2
(Full Year, College preparatory, UC-D, UC Honors course, 5 high school units per semester)
This honors-level college preparatory course is designed to introduce students to the fundamentals of biology including cell biology, genetics, molecular biology, evolution, and ecology. Students should focus on understanding and applying the material and on grasping big picture concepts. Emphasis is placed on cultivating critical thinking, problem-solving skills, and effective study habits throughout the course, in order to reinforce students' abilities to grasp complex concepts and to retain and apply knowledge. By the end of this course, students will have the proper foundation which they can develop as they continue their science education. The lectures in this course delve deeper into subject matter compared to the standard SC203 class, and students will engage in class activities, complete assignments, and undergo assessments that embody a heightened level of rigor consistent with the expectations of an honors-level class.

SC205 A/B PHYSICAL SCIENCE FOR ENGINEERING
(Full Year, College preparatory, UC-D, 5 high school units per semester)
This college-preparatory course introduces students to the fundamentals of physics and chemistry in preparation for upper-division science and technology classes. In the chemistry units, students learn about atomic and molecular structures, the periodic table, chemical bonding and the principles of conservation of mass and energy. Topics in physics include Newtonian mechanics and the conservation of energy and momentum. The fundamentals of thermodynamics and heat transfer are also included.

SC210 A/B AP BIOLOGY
(Full Year, College preparatory, UC-D, UC Honors course, 5 high school units per semester)
This AP Biology course is designed to offer students a solid curriculum in introductory college-level biology. Students will delve into eight comprehensive units that encompass the essential aspects of biology: chemistry of life, cell structure & function, cellular energetics, cell communication & cell cycle, heredity, gene expression & regulation, natural selection, and ecology. The course is structured around big idea statements, enduring understandings, and science practices that allow students opportunities to develop an appreciation for the science of biology and to identify and understand unifying principles within a diversified biological world. In contrast to a traditional high school biology course, AP Biology entails heightened rigors and expectations, challenging students to delve deeper into the subject matter and fostering college-level academic skills. Course includes a summer assignment that must be completed before the start of the fall semester. Students are required to take the CollegeBoard's AP Biology examination in the spring semester.

SC301 A/B GENERAL CHEMISTRY 1,2
(Full Year, College preparatory, UC-D, 5 high school units per semester)
This college-preparatory year-long course is designed to give students a basic but well-rounded understanding of the structure and properties of matter. The first topic covered is atomic structure,

including the history of its discovery, atomic models, electron configurations, and the periodic table of elements. Other topics include metric measurements and conversions, determination of density, states of matter, chemical formulas and equations, classifying chemical reactions and predicting their products, energy from reactions, stoichiometry, bonding, and the Gas Laws. Because of the integration of many labs throughout the course, safety and use of equipment are emphasized. Labs are performed regularly, written up in a formal manner.

SC301H A/B HONORS CHEMISTRY 1,2

(Full Year, College preparatory, UC-D, UC honors course, 5 high school units per semester)

This course is offered primarily to sophomore students as a preparation for AP Chemistry in the junior year. The chemical concepts and principles of this course are presented in such a way that the students will have a basic understanding of the structure and properties of matter. Topics include: the scientific method and its applications, symbols & the metric system, matter, formulas, chemical equations, atomic structure, stoichiometry, thermo-chemistry, nuclear chemistry, gasses, solutions, bonding, acid-base theory, oxidation-reduction, pH, and equilibrium. Frequent laboratory experiments and science fair projects will emphasize laboratory report writing and safety.

SC302 A/B AP CHEMISTRY

(Full Year, College preparatory, UC-D, UC Honors course, 5 high school units per semester)

This in-depth, college preparatory course provides students an opportunity to gain an understanding of chemical phenomena and their application. Emphasis is placed on the major principles covered in the AP Chemistry exam. In addition to a major emphasis on problem solving, the scientific method is reinforced in weekly lab experiments which emphasize the scientific method as well as laboratory procedures and report writing. Students are required to take the AP exam in May.

SC401 A/B PRINCIPLES OF PHYSICS 1,2

(Full Year, College preparatory, UC-D, 5 high school units per semester)

In this college preparatory course, students gain an understanding of physical phenomena and their application. Emphasis is placed on the major principles of physics, including motion, forces, momentum, mechanical energy, and waves. In addition to extensive algebraic problem solving, the scientific method is reinforced in lab experiments which apply the scientific method, laboratory techniques, and report writing.

SC403 A/B AP PHYSICS C – MECHANICS

(Full Year, College preparatory, UC-D, UC Honors course, 5 high school units per semester)

This in-depth, college preparatory course emphasizes the mathematical analysis of physics principles. The course helps students develop the analytical skills needed to solve college-level, calculus-based problems. Topics include mechanics of both translation and rotation, gravity, waves, and harmonic motion. Lab experiments emphasize the scientific method as well as laboratory techniques and report writing. Students are required to take the AP exam in May.

SC404 A/B ANATOMY AND PHYSIOLOGY

(Full Year, College preparatory, UC-G, 5 high school units per semester)

Anatomy & Physiology is a 4th year science course which covers both the anatomy (structures) and the physiology (functions) of the human body. Students first review chemistry, biology, and histology. This course then covers all eleven organ systems of the human body focusing on the main function of the system, its main organs, and its role in homeostasis. Various pathologies, drugs, or alcohol are covered as they relate to a particular system. As time permits we will also look objectively and factually into current healthcare issues. Labs are performed on a regular basis and include dissections.

SOCIAL SCIENCES

SO101 A/B WORLD HISTORY 1,2

(Full Year, College preparatory, UC-A, 5 high school units per semester)

This course will focus on the history of the world from the Enlightenment to the present time. A brief review of history prior to the Renaissance and Reformation will serve as a prelude to the course. Major historical eras, events, individuals and movements will be studied within the context of the present to illustrate the contributions and influences of the past on today's society. The course will be holistic and interrelate different aspects of world history such as the political, social, economic, religious, artistic and cultural elements so as to determine their relationships to each other and to ourselves. Students study major turning points that shaped the modern world including the cause and course of the two world wars. They trace the rise of democratic ideas and develop an understanding of the historical roots of current world issues, especially as they pertain to international relations. They extrapolate from the American experience that democratic ideals are often achieved at a high price, remain vulnerable, and are not practiced everywhere in the world. Students develop an understanding of current world issues and relate them to their historical, geographic, political, economic, and cultural contexts. Students consider multiple accounts of events in order to understand international relations from a variety of perspectives.

SO101H A/B HONORS WORLD HISTORY 1,2

(Full Year, College preparatory, UC-A, DBTI Honors course, 5 high school units per semester)

While following the general outline of SO 101AB: World History 1, 2 described above, this honors section provides an additional layer of work by concentrating on a year-long theme developed from STEM related subjects. Students are provided additional readings, essay topics and projects to enhance their experience. Admission to the class is based on reading, composition and social studies grades in the 7th and 8th grades or by student petition.

SO301 A/B UNITED STATES HISTORY 1,2

(Full Year, College preparatory, UC-A, 5 high school units per semester)

This course is a survey of the major turning points in American history from the Civil War to the present with an emphasis on the twentieth century. Following a brief review of key events prior to the Civil War, students study the major eras and events of the late-nineteenth and twentieth centuries including the impact of the industrial revolution and the development of a corporate economy, the changes in the ethnic composition of the American population, the movement toward equal rights for racial minorities and women, and the development of the United States as a world power. Students will also trace the historical development of contemporary social problems and the various attempts to solve them.

SO302 A/B AP UNITED STATES HISTORY

(Full Year, College preparatory, UC-A, UC Honors course, 5 high school units per semester)

This course is designed to prepare students to take the AP Exam in United States History. The course will cover American history beginning with the Age of Exploration up until the present era. Some eras are studied in greater detail so as to correspond with the published curriculum for all AP United States History courses. The course is structured holistically and attempts to contextualize the different aspects of American history by studying them in juxtaposition to other historical eras. Students are trained to write essays that conform to the College Board rubrics. Students are required to take the AP exam in May.

SO401 U.S. GOVERNMENT

(Half Year, College preparatory, UC-A, 5 high school units)

Students in grade twelve pursue a deeper understanding of the institutions of American government. They compare systems of government in the world today and analyze the history and changing interpretations of the Constitution, the Bill of Rights, and the current state of the legislative, executive, and judiciary branches of government. An emphasis is placed on analyzing the relationship among federal, state, and local governments, with particular attention paid to important historical documents such as the Federalist Papers. These standards represent the culmination of civic literacy as students prepare to vote, participate in community activities, and assume the responsibilities of citizenship.

SO402 AP UNITED STATES GOVERNMENT AND POLITICS

(Half Year, College preparatory, UC-A, UC Honors course, 5 high school units)

This course is designed to give students an analytical perspective on government and politics in the United States. It includes both the study of general concepts used to interpret U.S. politics and the analysis of specific examples. The course focuses on the various institutions, groups, beliefs, and ideas that constitute U.S. politics. The class is taught at a level equivalent to that found in a typical introductory college-level course in American government and politics and prepares students to take the AP exam in United States Government and Politics. General topics include: The Background and Content of the Constitutional and Bill of Rights; The Relationships between the States and the Federal Government in a Federal System; The Political Beliefs and Behaviors of Americans; The Roles and Functions of Political Parties, Interest Groups, and the Mass Media in American Government and Politics; The Structure, Operations, and Role of the Institutions of National Government – the Congress, the Presidency, the Bureaucracy, and the Courts; The Formulation, Enactment, Implementation, and Interpretation of Public Policy; and, Civil Rights and Civil Liberties in America. Students are required to take the AP exam in May.

SO403 AP MACROECONOMICS

(Half Year, College preparatory, UC-G, UC Honors course, 5 high school units)

An analytical approach to economic principles with an emphasis on macroeconomic theory. Among the topics discussed are supply and demand, national income accounting, the income-expenditures approach to equilibrium, inflation, banking, the Federal Reserve System, business cycles, and international trade and finance. Students are required to take the AP exam in May.

SO404 PRINCIPLES OF ECONOMICS

(Half Year, College preparatory, UC-G, 5 high school units)

This introductory course stresses a non-analytical approach to economic principles with an emphasis equally divided on topics from microeconomics and macroeconomics. Topics include the theory of the firm; supply and demand; pure competition, oligopoly, and monopoly; national income accounting; inflation and deflation; banking and the Federal Reserve System; business cycles; and international trade.

SO410 A/B AP HUMAN GEOGRAPHY

(Full Year, College preparatory, UC-G, UC Honors course, 5 high school units per semester)

This course focuses on the patterns of human life on Earth. Topics include population and migration, as well as culture, language, religion, and ethnicity. Also, political geography, urban geography, and various aspects that make up economic geography will be covered. Students will learn the different ways geographers think in approaching topics in the world around us; be able to see and identifying global and local patterns of human action, distribution and diffusion; interpret various maps and spatial data and also display information in a variety of methods; make connections between various facets of human activity; define regions and evaluate the regionalization process; and characterize and analyze changing interconnections among places. Students who enroll in this course are required to take the AP exam.

RELIGION/THEOLOGY

THEO101 REVELATION (The Revelation Of Jesus Christ In Sacred Scripture)

(Half Year, College preparatory, UC-G, 5 high school units)

The purpose of this course is to give students a general knowledge and appreciation of the Sacred Scriptures. Through their study of the Bible, they will come to encounter the living Word of God, Jesus Christ. Students will learn about the Bible, authored by God through Inspiration, and its value to people throughout the world. If they have not been taught this earlier, they will learn how to read the Bible and will become familiar with the major sections and the books included in each section. The students will pay particular attention to the Gospels, where they may grow to know and love Jesus Christ more personally.

THEO102 JESUS CHRIST (Who Is Jesus Christ?)

(Half Year, College preparatory, UC-G, 5 high school units)

The purpose of this course is to introduce students to the mystery of Jesus Christ, the living Word of God, the Second Person of the Blessed Trinity. Students will understand that Jesus Christ is the ultimate Revelation from God. In learning about who he is, the students will also learn who he calls them to be.

THEO201 PASCHAL MYSTERY (The Mission Of Jesus Christ)

(Half Year, College preparatory, UC-G, 5 high school units)

The purpose of this course is to help students understand all that God has done for us through his Son, Jesus Christ. They will learn that from all eternity, God has planned for us to share eternal happiness with him, which is accomplished through the redemption Christ won for us. Students will learn that they share in this redemption only in and through Jesus Christ. They will also be introduced to what it means to be a disciple of Christ and what life as a disciple entails.

THEO202 THE CHURCH (Jesus Christ's Mission Continues Through The Church)

(Half Year, College preparatory, UC-G, 5 high school units)

The purpose of this course is to help the students understand that in and through the Church they encounter the living Jesus Christ. They will be introduced to the fact that the Church was founded by Christ through the Apostles and is sustained by him through the Holy Spirit. The students will come to know that the Church is the living Body of Christ today.

THEO301 SACRAMENTS (Sacraments As Privileged Encounters With Jesus Christ)

(Half Year, College preparatory, UC-G, 5 high school units)

The purpose of this course is to help students understand that they can encounter Christ today in a full and real way in and through the sacraments, and especially through the Eucharist. Students will examine each of the sacraments in detail so as to learn how they may encounter Christ throughout life.

THEO302 MORALITY (Life In Jesus Christ)

(Half Year, College preparatory, UC-G, 5 high school units)

The purpose of this course is to help students understand that it is only through Christ that they can fully live out God's plans for their lives. Students will learn the moral concepts and precepts that govern the lives of Christ's disciples.

THEO401 VOCATIONS (Responding To The Call Of Jesus Christ)

(Half Year, College preparatory, UC-G, 5 high school units)

The purpose of this course is to help students understand the common baptismal call to love God and serve others. Students will learn that it can be lived out in four unique ways: married life, single life, ordained life and consecrated life. They will learn how to apply the discernment process to their lives.

THEO402 SOCIAL JUSTICE (Living As A Disciple Of Jesus Christ In Society)
(Half Year, College preparatory, UC-G, 5 high school units)
The purpose of this course is to introduce students to the Church's social teaching. In this course, students are to learn how Christ's concern for others, especially the poor and needy, is present today in the Church's social teaching and mission.

TECHNOLOGY EDUCATION DEPARTMENTS & COURSES

FRESHMEN TECHNOLOGY ROTATION COURSES

(First semester of freshman year only)

ACE111 INTRODUCTION TO ARCHITECTURE & CONSTRUCTION ENGINEERING
(Six-weeks-long, 3 high school units)
This course is an overview of the Architecture & Construction Engineering (ACE) program. An introduction to architecture, construction and engineering processes with discussions of occupations within these industry sectors opens the course. Additional topics include basic measuring and layout methods, review of construction materials, use of basic hand tools, some modeling experiences in structural design, safety training in and the proper use of a limited number of power tools. The major project is the design and construction of a wood truss style bridge that will be failure tested.

BMET101 INTRODUCTION TO BIOLOGICAL, MEDICAL AND ENVIRONMENTAL TECHNOLOGY
(Six-weeks-long, 3 high school units)
This course is designed to introduce students to the fundamentals of the biological, medical, and environmental technological fields. Over the course of the rotation each main topic will be covered; biological/medical (cell cycle and cancer unit), environmental (plastic waste inventory project plus selected literature), as well as an intro to biotechnology (gel electrophoresis of candy dyes). As this is a college preparatory course, its rigors will reflect a shift towards a college level of work. Students should not simply memorize the material presented to them, but focus on understanding and applying the material. Students should concentrate on grasping the big picture rather than the minor details.

CSEE100 INTRODUCTION TO COMPUTER SCIENCE AND ELECTRICAL ENGINEERING
(Six-weeks-long, 3 high school units)
This course is an overview of the Computer Science & Electrical Engineering program for freshmen who are considering choosing CSEE as their technology major. Students gain an introductory level of knowledge as well as first-hand laboratory experience in both computers (including personal computer hardware and introductory programming) and electronics (including wiring, measuring instruments, analog/digital circuits, and soldering). In addition, students learn about various education and career paths associated with the computer science and electrical engineering disciplines.

IDEA100 INTRODUCTION TO INTEGRATED DESIGN, ENGINEERING & ART
(Six-weeks-long, 3 high school units)

This course introduces students to various aspects of the Design process, which serves as the thematic core for Integrated Design Engineering and Art (IDEA). Students gain firsthand experiences along with an introductory level of knowledge (both in theory and laboratory) in: basic drawing skills, the Design process, graphic language, thumbnail sketching, pictorial drawing, human character design and 3-D modeling. IF students earn a satisfactory grade they will be given a letter of recommendation at the conclusion of the course.

MAT101 INTRODUCTION TO MEDIA ARTS & TECHNOLOGY

(Six-weeks-long, 3 high school units)

This course is an overview of the Media Arts & Technology program for freshmen who are considering choosing MAT as their technology major. Students gain an introductory level of knowledge as well as first-hand laboratory experience working with a selected group of computer production software (Adobe Photoshop, Illustrator, After Effects, and Blender). Freshman projects include hands-on computer animation and programming a simple interactive computer game. In addition, students learn about various educational and career paths associated with the media arts field.

MSET100 INTRODUCTION TO MATERIALS SCIENCE, ENGINEERING AND TECHNOLOGY

(Six-weeks-long, 3 high school units)

This course introduces students to various aspects of these career and educational pathways which serve as the thematic core for the Materials Science, Engineering and Technology major. Students gain firsthand experiences along with an introductory level of knowledge (both in theory and laboratory) in: fundamentals of foundry, welding, mechanical and nondestructive testing, basic chemical analysis, basic microscopy, metallography, careers and related safety practices. During this course students are evaluated by the department faculty on their performance and aptitude. Students likewise are able to evaluate the technology as part of their overall rotation program experience which is designed to assist them in ultimately choosing a Technology major. Students who successfully meet all of the requirements of this course receive a “recommendation” as part of their evaluation and thus satisfy the technological qualification for this program of study.

ARCHITECTURE AND CONSTRUCTION ENGINEERING

ACE123 FOUNDATIONS OF RESIDENTIAL & COMMERCIAL CONSTRUCTION (BITA 1)

(Half Year, College preparatory, UC-G, 5 high school units)

Building Industry Technology Academy 1 (BITA 1) is the foundation course for a two-year high school construction program called Eco-Design. Green construction, also known as sustainable building, will be a central and ongoing theme throughout the two-year program curriculum. Participating students will learn how to design and build structures that are environmentally responsible and resource efficient. BITA 1 introduces students to the art of residential construction while laying the foundation for future careers in construction and architecture. Year one offers students the opportunity to gain basic construction skills in the use of hand tools, operation of machine tools, types of regular and green construction materials, construction and organizational operations, sub-flooring, framing, roofing, blueprint reading, surveying and construction-specific mathematics. During the introductory year, students will work in teams to build a tiny house and participate in a building competition. Students will begin and develop career portfolios, participate in field trip experiences and be exposed to networking opportunities. Core academic standards and skills are integrated into the construction curriculum, providing students the connection between course technical skills and academic classes. Colleges and universities recommend

that students who are interested in careers in architecture engineering take the BITA pathway to prepare them for post-secondary related studies.

ACE231 ARCHITECTURAL DESIGN

(Half Year, College preparatory, UC-F, 5 high school units)

This is an introductory course where students learn the fundamentals of architectural design. This includes the nature of space, balance, hierarchy, form, volume, texture, rhythm, composition, and geometry in 2 and 3 dimensions. In addition students learn the history of architecture design, architectural styles and related careers. Students will increase awareness of building form, both residential and commercial, and understand the relationship of the built environment with the people that occupy the space. Using knowledge gained through personal experience, instruction, and research, students will develop conceptual plans for a 1,200 Sq. Ft. house of their own design, following a program provided by a mythical client. Student designs will be completed using mediums such as pencils and Photoshop. The use of Building Information Modeling (BIM) software will facilitate the development of working drawings for their original house design, including plans, elevations, sections and details that conform to architectural document standards.

ACE241 STUDY OF MODERN CRAFTSMANSHIP AND INFRASTRUCTURE (BITA 2)

(Half Year, College preparatory, UC-G, 5 high school units)

The Study of Ancient Civilization Infrastructure and Craftsmanship course is designed to gain an in-depth understanding of the history behind construction, materials, and trades in the industry. Students will use Primary Sources and become Construction Historians as they reconstruct the advancement of the trades, materials, and tools that are now being used in residential and commercial construction. The course covers a more advanced knowledge of safety, use of hand and power tools, blueprint reading, geometry, and estimating. Integrated throughout the course are foundation standards, which include communication, ethics, interpersonal/team skills, critical thinking and other employment skills needed for the 21st Century. Upon completion of this course, students will be able to perform the duties of an entry-level building construction technician with the knowledge of Construction Codes and general and trade-specific terminology.

ACE313 GREEN & ENERGY EFFICIENT ENGINEERING

(Half Year, College preparatory, UC-D, 5 high school units)

Introduction to Green Technology will prepare students for learning in the emerging engineering fields of green technology, environmental technology and renewable energy forms. The focus of the course is on physics and environmental science, which also includes a laboratory component. Students will analyze various energy forms, such as: thermodynamics, forces, kinetic energy, renewable energy and electromagnetism. Students will conduct hands-on experiments to help aid and increase content retention. Overall, the course is a project-based laboratory course in physics and environmental science that will help prepare students for careers in emerging fields of green technology, environmental science and renewable energy forms.

ACE323 BRIDGES AND STRUCTURES ENGINEERING

(Half Year, College preparatory, UC-D, 5 high school units)

This course teaches the evolution and history of bridge design, from ancient Roman arches to the modern cable-stay bridge, and steel reinforced concrete freeway overpasses. Students will build testing devices and samples of struts and girders to test for tensile and compressive strength as it relates to mass and application. Each student will design a bridge using engineering software that will calculate loads, stresses and forces applicable to their design. Students will use their design to build a scale model that

will compete to be entered in a design-build competition hosted by the Building Industry Association. The course concludes with an introduction to highway and transportation design and engineering.

ACE413 SENIOR PROJECT

(Half Year, College preparatory, UC-G, 10 high school units)

Students will explore the many different ways to present their new and unique ideas and designs using story boards, conceptual and scale models, and presentation drawings. The capstone projects require students to utilize the architectural theory, construction applications, engineering considerations and Revit CAD software abilities they have developed throughout the ACE program. Each student will prepare a theme park attraction storyline, story board and scale conceptual model. These story boards and models are critiqued by industry professionals. Another project will have students reimagining and designing an abandoned commercial property into something new and current to acknowledge gentrification of an inner-city up-and-coming area. The project will include architectural presentation drawings and scale model from those presentation drawings, following criteria provided by an inter-school design competition our school participates in. Requirements include: preparing floor plans, exterior elevations, cross-sections, 3-D renderings, a fully realized site plan with detailed landscaping, and includes interior design and architectural symbols, and adding sustainability and ADA information relevant to their design. The scale model will reflect the same details that are found on the plans, excluding interior details. Approved designs are entered into the annual Building Industry Association design competition.

ACE421 EMERGING CONSTRUCTION ADVANCES & CHANGES (BITA 4)

(Half Year, College preparatory, UC-G, 10 high school units)

BIOLOGICAL, MEDICAL AND ENVIRONMENTAL TECHNOLOGY

BMET103 PRINCIPLES OF BIOMEDICAL SCIENCE & BIOENGINEERING

(Half Year, College preparatory, UC-D, 10 high school units)

This course serves as an engaging introduction to the fascinating field of biotechnology, designed specifically for high school freshmen who have selected BMET as their technology focus here at Don Bosco. Students will explore the fundamental concepts and practical applications of biotechnology, including but not limited to laboratory experience with techniques of DNA analysis, bacterial transformation, and the polymerase chain reaction. Through this combination of theoretical knowledge and hands-on activities, students will gain a solid foundation in the key principles and techniques utilized in biotechnology. The course aims to foster curiosity, critical thinking, and scientific inquiry while emphasizing the ethical considerations and societal impact of biotechnological advancements.

BMET203 MEDICAL AND ENVIRONMENTAL INTERVENTIONS

(Full Year, College preparatory, UC-D, 5 high school units per semester)

Medical Interventions (MI) allows students to investigate the variety of interventions involved in the prevention, diagnosis, and treatment of disease as they follow the lives of a fictitious family. A “How-To” manual for maintaining overall health and homeostasis in the body, the course will explore how to prevent and fight infection, how to screen and evaluate the code in our DNA, how to prevent, diagnose, and treat cancer, and how to prevail when the organs of the body begin to fail. Through these scenarios students will be exposed to the wide range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics. Each family case scenario will introduce multiple types of interventions, reinforce concepts learned in the previous semester.

BMET301 BIOMEDICAL & ENVIRONMENTAL INNOVATIONS

(Half year, College preparatory, UC-G, 10 high school units)

In this capstone course, students apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as they work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. They have the opportunity to work on an independent project (see BMET303) and may work with a mentor or advisor from a university, hospital, physician's office, or industry. Throughout the course, students are expected to present their work to an adult audience that may include representatives from the local business and healthcare community.

BMET303 ADVANCED METHODS IN BMET

(Half year, College preparatory, UC-D, 10 high school units)

The course is designed to allow students to create, design, and analyze their own individual research project. Students will be using science and engineering practices to research a topic of choice, formulate a question and hypothesis. Students will design research methods for their project. They will collect data and analyze results. Students will have a chance to discuss their results with the scientific community if they choose to enter their research project into a competition. If students do not choose to enter into a competition (LA County Science and Engineering Fair) results will be shared with the BMET community.

BMET401 ADVANCED MEDICAL BIOTECHNOLOGY A/B

(Full Year, College preparatory, UC-D, 5 high school units per semester)

Advanced Medical Biotechnology is a course that is intended for students who have completed the first 3 years of BMET scope and sequence. Students will gain additional knowledge in upper-level biochemistry, molecular biology, and laboratory techniques. The course will examine the tools and techniques of DNA and protein manipulation and analysis. Lessons will engage students in conducting laboratory experiments, collecting and analyzing real data, researching and communicating scientific information, and critically discussing the ethical and social issues surrounding the use of biotechnology in today's society.

BMET405 A/B AP ENVIRONMENTAL SCIENCE

(Full Year, College preparatory, UC-D, UC Honors course, 5 high school units per semester)

In this AP Environmental Science course, students will delve into nine comprehensive units that encompass the essential aspects of environmental science: the living world (ecosystems), the living world (biodiversity), populations, Earth systems & resources, land & water use, energy resources & consumption, atmospheric pollution, aquatic & terrestrial pollution, and global change. The course helps students identify and analyze natural and human-induced environmental problems. It enables them to learn how to assess the risks associated with these problems and evaluate alternative solutions for resolving and preventing them. The course is structured around big idea statements, enduring understandings, and science practices that allow students opportunities to develop an appreciation for environmental science and to identify and understand unifying principles within the environmental world. In contrast to a traditional high school science course, AP Environmental Science entails heightened rigors and expectations, challenging students to delve deeper into the subject matter and fostering college-level academic skills.

COMPUTER SCIENCE AND ELECTRICAL ENGINEERING

CSEE113 INTRODUCTION TO ROBOTIC ENGINEERING

(Half Year, College preparatory, UC-D, 10 high school units)

This course serves as an introduction to robotics and artificial intelligence. The course presents several basic concepts of engineering (research, planning, prototyping, and testing) via the construction and programming of modern robotic kits. In this course, students will apply the programming and electronics skills that they previously learned in the "Introduction to Computer Science and Electrical Engineering" (CSEE100) course. This course utilizes the C++ programming language and the Arduino microcontroller.

CSEE201 DC CIRCUIT FUNDAMENTALS

(Half Year, College preparatory, UC-G, 5 high school units)

This course serves as an introduction to basic electronics circuit theory. The course presents the basic concepts of DC circuit theory including Ohm's Law, Watt's Law, and Kirchhoff's Laws as applied to resistive and passive circuits. The course introduces the student to the relationship between voltage, current, and resistance and circuit analysis techniques for solving series, parallel, and complex circuit networks. Lecture material is supported through laboratory assignments where the student is trained in the use of standard electronics test equipment. In addition, students are introduced to a computer-based circuit design simulation program (Multisim) as a tool for analyzing and troubleshooting circuits.

CSEE221 A/B AP COMPUTER SCIENCE PRINCIPLES

(Full Year, College preparatory, UC-D, UC Honors course, 5 high school units per semester)

This yearlong course is roughly the equivalent of a one semester, college-level course in introductory computer science. The major areas of the course are organized around five main 'Ideas':

- Creative Development (CRD)
- Data (DAT)
- Algorithms and Programming (AAP)
- Computing Systems and Networks (CSN)
- Impact of Computing (IOC)

The course content is consistent with preparation for the AP Computer Science Principles examination. Students enrolled in this course are required to take this examination in May. As such, the course also includes strategies for success on the examination. This course utilizes the Python programming language.

CSEE223 DIGITAL SYSTEMS

(Half Year, College preparatory, UC-G, 5 high school units)

This course is an introduction to digital electronics from a "black box" perspective, using standard TTL integrated circuit devices. The course begins with a presentation of binary mathematics, truth tables, AND/OR logic gates, and inverters. Students will be introduced to techniques for digital circuit simplification using Boolean algebra, and Karnaugh mapping. Students will study an important logic configuration, known as a "half-adder", that is key to providing arithmetic functionality in computers and calculators. Finally, they will explore the applications of various "flip-flop" memory devices, multiplexors, encoders, and decoders.

CSEE321 AC CIRCUIT ANALYSIS

(Half Year, College preparatory, UC-G, 5 high school units)

This course expands the basic concepts of circuit analysis to include time-dependent components such as inductors and capacitors. Students will learn the concepts of time constants and resonance, and they will be able to analyze and design basic R-C, L-C, and R-L-C circuits in both series and parallel configurations. In support of the lecture material, students will be given a number of laboratory assignments where they will learn how to use function generators and oscilloscopes to observe and

measure AC circuit behavior. This course is intended to prepare students for future courses in analog and digital circuit design.

CS403 A/B AP COMPUTER SCIENCE A

(Full Year, College preparatory, UC-C, UC Honors course, 5 high school units per semester)

This year-long course meets the guidelines of the College Entrance Examination Board and is roughly the equivalent of a one semester, college-level course in introductory computer science. Students will learn:

- Design and implement computer-based solutions to problems in a variety of application areas.
- Use and implement common data structures.
- Implement and use iterative and recursive algorithms.
- Develop and select appropriate algorithms and data structures to solve processing problems that commonly arise during the development of computer software.
- Code fluently in an object-oriented paradigm using the Java programming language.
- Be capable of developing a complex application program consisting of several related object classes, including the design process leading to such programs.

The course content is consistent with preparation for the AP Computer Science A examination. Students enrolled in this course are required to take this examination in May. As such, the course also includes AP-recommended and AP-optional labs as well as strategies for success on the examination. This course utilizes the Java programming language.

CSEE411 SEMICONDUCTOR AND ANALOG CIRCUIT DESIGN

(Half Year, College preparatory, UC-G, 5 high school units)

This course is a comprehensive introduction to analog electronics that deals primarily with TTL circuit technology. The basic physics concepts of semiconductor devices such as diodes and transistors are presented. Along with circuit construction and troubleshooting, the student will use basic DC and AC analysis of circuits that contain semiconductor components. Major applications in the course are DC power supplies and transistor amplifier, oscillator, and switching circuits. Laboratory experiments support the theory presented. The course is intended for students that are planning further college or university studies in the fields related to engineering, physics, electronics or computer science and provide exposure to semiconductor physics. The electronic theory and laboratory work will reflect topics covered at the college level and emphasize general study, mathematical and communications skills. Laboratory work will include circuit calculations, observations and measurements.

CSEE421 LINEAR OPERATIONAL CIRCUITS

(Half Year, College preparatory, UC-G, 5 high school units)

This course introduces the student to linear integrated circuits. He will gain the skills to research their capabilities, set up their recommended test circuits, and describe their behavior. Emphasis will be placed on operational amplifiers. Other devices explored will include power transistors to assist an operational amplifier, class B linear amplifiers, analog to digital converters, digital to analog converters, analog differentiators and integrators.

CSEE423 RF & MICROWAVE COMMUNICATIONS

(Half Year, College preparatory, UC-G, 5 high school units)

Radio frequency and microwave circuits present special difficulties due to the extremely high frequencies that are involved, many times beyond the reach of traditional laboratory instruments like meters and oscilloscopes. This course introduces students to measurements in the VHF, and UHF regions (30 MHz – 30 GHz), and leads him to build and test useful building blocks for radio communication. Some work will be done in the AMand FM radio band, where traditional instrumentation is still useful.

CSEE425 SOFTWARE ENGINEERING

(Full Year, College preparatory, UC-D, 5 high school units per semester)

This course builds on the programming skills that students have learned in AP Computer Science Principles and AP Computer Science A. Students taking this course will learn the fundamentals of software engineering, including project life cycle, project proposal, timeline, scrum/agile software development, client communication, specifications, requirements, product design, team dynamics, skills assessment, version control, minimally viable product, and testing. Emphasis is placed on developing further depth of knowledge in computer science and teamwork skills needed for the projects. Students will create projects utilizing software engineering principles and process with the instructor acting as the project manager.

INTEGRATED DESIGN ENGINEERING AND ART

IDEA113 INTRODUCTION TO ROBOTICS ENGINEERING

(*Half Year, College preparatory, UC-G, 10 high school units)*

This course is designed to help students acquire the skills needed to design and build a robot. Students who complete IDEA113 also have the skills necessary to actively participate on the school's FIRST Robotics team. Students work with the instructors/mentors and senior members of the team to develop expertise in areas such as Computer-Aided Design (CAD), use of machine tools (lathe, mill, saws, CNC equipment, welding, etc), electronics, and software. The course is very hands-on; students work in the robotics lab to design and build prototypes, including a Mechatronics Design Project and Mechanical Design Project.

IDEA205 DESIGN PROCESS AND MODEL MAKING

(*Half Year, College preparatory, UC-F, 10 high school units)*

Is the exploration into the Design Process and its role in developing a solution to a Design problem. The goal is to realize that with this technique everyone can develop a solution to a problem and its wide possible applications outside the field of design. Built on the side is the desire for the student to gain valuable communication skills and individual self-awareness in the process. The course requires that each student explore and improve his verbal (oral) communication skills through a number of class presentations. Students will also learn basic model making skills that will help them in the fields of product, transportation and architecture.

IDEA208 INTRODUCTION TO MECHANICAL DESIGN ENGINEERING

(Half Year, College preparatory, UC-D, 5 high school units)

To provide students a fundamental understanding of Mechanical Engineering Design using Computer Aided Design (CAD) software. Students will understand the fundamentals of using SOLIDWORKS in order to make engineering models, drawings and assemblies. The graphics representation of design students will learn are views, sections, dimensioning, and tolerancing. Students will also be able to evaluate their design by adding material and analyzing mass properties, interference detection, stress analysis and sustainability of design. The course will end with the students designing and analyzing their own product on SOLIDWORKS along with a final technical report. (*This one semester-equivalent course is paired with MSET208 for IDEA students and with MSET244 for MSET students.)*

IDEA303 PRODUCT DESIGN

(Half Year, College preparatory, UC-D, 10 high school units)

Students carry original design concepts through the Design Process (research, idea sketching and prototypes). As well as learn to develop basic 3-D models and formal Mechanical Drawings using CAD software. The course provides some exception to allow for the inclusion of improvement and re-engineering of existing product housing. The ultimate goal of the course and each student is to understand the Design Process and it's key role in developing a successful solution to the problem. The course concludes with each group introducing and defending their product through a presentation.

IDEA304 TRANSPORTATION DESIGN

(Half Year, College preparatory, UC-G, 10 high school units)

Students design and develop a drone helicopter that will accomplish a task of their choosing. They will implement the Design Process (research, idea sketching and prototypes), along with developing basic 3-D models and formal Mechanical Drawings using CAD software. The ultimate goal of the course and each student is to understand the Design Process and its key role in developing a successful solution to a problem. The course concludes with each group introducing and defending their product through a presentation.

IDEA401 ARCHITECTURAL DESIGN

(Half Year, College preparatory, UC-F, 10 high school units)

This course provides students an overview of architecture residential drawings and designs. Students will learn the basic principles needed to understand architectural design. Students will also learn how to use a 3-D modeling program AutoDesk Revit in order to make their working drawings and 3-D models of their designs. Students will also learn about the advancements in Green technology that are becoming more visible in housings and businesses. This should allow the students to gain an understanding of the creative process to designing a building as well as what mathematical tools will be needed in this profession.

IDEA403 SENIOR PROJECT

(Half Year, College preparatory, UC-G, 10 high school units)

In this course students have the opportunity to embark in the aspect of design that inspires them the most. Whether that is Character Design, Product Design or Architectural Design, students will produce a proposal for their senior project that must be approved by the Department Chair as well as Technology Instructor. The objective of this course is for students to draw upon previous coursework to provide a solution for a real world problem. Students will focus on design, project planning, prototyping fabrication, assembly and testing. Students will also be required to write formal reports and formal oral presentations. This project can either be completed individually or as a team.

MEDIA ARTS AND TECHNOLOGY

MAT103 DIGITAL MEDIA FUNDAMENTALS

(Half Year, College preparatory, UC-F, 10 high school units)

An introduction to digital media using the Adobe Suite (Photoshop, Illustrator, Indesign). Students learn and apply fundamentals of various software applications to complete web design, image editing, illustration, drawing and graphic design projects. Advertising and marketing projects coordinate technical skills with organization, management, communication, ethics and teamwork media. The principles/elements of design are emphasized throughout the course work.

MAT201 DIGITAL PHOTOGRAPHY & COMPOSITION

(Half Year, College preparatory, UC-F, 10 high school units)
An introduction to digital photography involves the process of capturing an image with a digital camera, manipulating and correcting the image (Photoshop and LightRoom), and producing portfolios. This course addresses the technical, aesthetic, and conceptual challenges implicit with digital photography. Current studio practices and lighting theory are covered, as well as, green screen techniques.

MAT214 VIDEO PRODUCTION AND EDITING
(Half Year, College preparatory, UC-F, 10 high school units)
An introduction to video & editing involves proper use of digital video cameras and editing software(Adobe: Premiere and AfterEffects). Organizing and planning the video with storyboards, scripting and production gathering are among the activities for proper storytelling video production. Post production activities will include the addition of music, sound and special effects to student made films. An emphasis is placed on lighting, composition, camera angle and movement, and construction of basic filming equipment.

MAT311 3D ANIMATION
(Half Year, College preparatory, UC-F, 10 high school units)
An introduction to basic methods and practices in animation. The course will provide an overview of techniques ranging from hand-drawn frame-by-frame animation, to object animation and pixilation to 3d rendering (Blender). Classes consist of a short demonstration, viewing of related works, & hands-on experimentation. Weekly assignments will further student's exploration of animation approaches and techniques. Students will have an understanding of basic key frames, character sketches and designs, flipbooks, stop motion, 3D models, and 3D animations.

MAT313 AUDIO ENGINEERING
(Half Year, College preparatory, UC-F, 10 high school units)
An introduction to audio engineering includes proper use of recording equipment and use of digital editing software (FL Studio, Audition and Audacity). Post production activities will include the addition of music, sound and foley effects to student made films. An emphasis is placed on recording sound, manipulating waveforms and the production of studio length music.

MAT 411 MEDIA CAMPAIGN DEVELOPMENT
(Half Year, College preparatory, UC-G, 10 high school units)
Senior MAT students, working in groups, will produce a marketing plan. Capstone projects are intended to be intensive, active learning projects, requiring significant effort in the planning and implementation, as well as preparation of a business plan and product/service to be brought to market. The goal of the capstone project is creation of a multimedia promotional campaign for a student-designed product that incorporates aspects of print, video and interactive media. This first course deals mostly with marketing theory and practices in developing a product.

MAT 413 DIGITAL MARKETING/ SENIOR CAPSTONE
(Half Year, College preparatory, UC-G, 10 high school units)
A culmination of the 4-year MAT experience through the design, creation, and maintenance of web pages and mobile apps. Concepts such as effective design, usability, organization of content, and web publishing will also be discussed. Students will incorporate their knowledge of media and design into their capstone project, as well as through preparation for life after high school. Students will understand and complete web / app designs, networking fundamentals, a resume, a portfolio site, and a final capstone project.

MATERIALS SCIENCE, ENGINEERING AND TECHNOLOGY

MSET103 INTRODUCTION TO MATERIALS PROCESSING

(Half Year, College preparatory, UC-D, 10 high school units)

This course is designed as an introduction to materials science and materials processing. Topics of interest will include the following: manufacturing and processing of materials; atomic structure and bonding; periodic table fundamentals and how they relate to material properties. This course provides insight on metals, polymers, ceramics, and composites. Labs focus on Materials Processing techniques including primary shaping (casting and forming), joining (welding and braising), and surface treatment (sand blasting, coating and polishing).

MSET243 MECHANICAL TESTING

(Half Year, College preparatory, pre-engineering, 10 high school units)

This course is an introduction to the basic principles and practices of materials evaluation using the fundamentals of Mechanical Testing. Areas covered will include the following testing methods: tensile, fatigue, hardness, impact, creep, on metallics and non-metallic materials. In addition to basic theory concepts, students will obtain practical knowledge and "hands-on" experiences in generating, collecting, and interpreting data in laboratory situations.

MSET 208 MATERIALS FOR DESIGN ENGINEERS

(Half Year, College preparatory, pre-engineering, 5 high school units)

This introductory course will familiarize the design engineering student to the basic classes of materials, the properties of materials, and to the production, processing, fabrication and compatibility of metals and materials. In addition, the various techniques used to characterize materials properties will be demonstrated. A hands-on session addressing welding and joining techniques will be provided. The lectures will be complemented with laboratory sessions and demonstrations. (*This one semester-equivalent course is paired with IDEA208 for IDEA students.)*

MSET244 NON-DESTRUCTIVE TESTING

(Half Year, College preparatory, UC-D, 5 high school units)

This course is designed as an introduction to the basic principles and practices of materials evaluation using the fundamentals of non-destructive testing (NDT). Specific areas covered include visual, liquid penetrant, magnetic particle, radiographic, ultrasonic, and eddy current testing. Students obtain practical knowledge through experience in laboratory situations in addition to basic theory. Experiments are performed to enhance and reinforce topics covered in lectures. The laboratory sessions require that the student develop a working knowledge of magnetism, electricity, capillary action, physics (buoyancy, displacement, the Compton effect), and assessment of flaws. The course also provides an introduction to data and formula management using Microsoft Excel, a common software tool used widely in the engineering field. Areas of interest include cell usage, equations, and tips to increase productivity and efficiency. *(This one semester-equivalent course is paired with IDEA208 for MSET students.)*

MSET332 METALLOGRAPHY

(Half Year, College preparatory, UC-D, 10 high school units)

This course is an introduction to the fundamentals of Metallography and for the visual and light microscopy of metals and engineered materials. Preparation techniques necessary to accurately assess the structure, properties and composition of materials will be applied. In addition, the metallurgy of

common alloy systems will be discussed and advanced optical measuring techniques, quantitative metallographic and micro-hardness techniques will be utilized in data evaluation and report preparation.

MSET333 INTRODUCTION TO POLYMERS

(Half Year, College preparatory, UC-D, 10 high school units)

Introduction to Polymers is an introduction to organic compounds and their characteristics. Classification of plastics, overview of common plastics and polymers, elementary molecular structures and related mechanical, chemical and physical properties, typical applications and products, major production methods and testing of polymers to ASTM standards are the major topics covered.

MSET431 FAILURE ANALYSIS

(Full Year, College preparatory, UC-D, 5 high school units per semester)

This course will introduce the fundamentals of failure analysis by applying the theories and procedures learned in previous MSET core courses to the analysis of real world metals/materials failures. The course will introduce current failure analysis and problem solving techniques including data assimilation, fracture handling & analysis, micro/macro-optics, Scanning Electron Microscopy, Fracture mode/mechanism identification and characterization and data interpretation, presentation and reporting. Case histories of actual service failures will be reviewed and discussed. In addition, the interpretation and use of specifications and blueprints as valuable tools in the analytical process will be provided. The moral and legal issues associated with failure investigations will also be discussed.

MSET441 CHEMICAL ANALYSIS

(Full Year, College preparatory, UC-D, 5 high school units per semester)

A survey of commonly used laboratory testing methods for both metallic and nonmetallic material systems. These will include theory and application of gravimetric analysis, volumetric analysis, and potentiometric titrations. The fundamentals of Fourier Transfer Infrared spectroscopy, atomic emission, ultraviolet-visible spectroscopy, and x-ray fluorescence will be introduced.