

## ACE Technical Course Descriptions

### **Science Courses**

#### **PHYSICS – 1 Unit – 9<sup>th</sup> grade**

*Prerequisites: Concurrently taking Algebra*

This is an introductory level physics course. The course will emphasize the combining of algebra skills and inquiry-based exploration of fundamental physics concepts. Students will investigate the following topics: laws of motion; acceleration and force; weight; composition of matter; energy transfer; heat and temperature; wave motion; properties of light, colors, lenses, and mirrors; static electricity and magnetism. Students will create and maintain an Interactive Notebook to keep a conceptual and graphical record of their learning.

#### **BIOLOGY I – 1 Unit – 9<sup>th</sup> grade**

*Prerequisites: Concurrently taking Algebra 1*

This is an introductory level biology course, emphasizing the investigation of living organisms and their life processes. Students will explore the following topics: Characteristics and classification of living organisms; the history of life on earth, adaptations and ecological systems; patterns and interrelationships among living systems, both internal and external; genetics, inheritance, and bioengineering; the human body, health, disease and immunity; bioethics and technology. Students will work within established safety requirements, perform laboratory investigations and manipulate data, be expected to complete and present several projects, and produce a final portfolio project relating biological concepts to design and construction principles.

#### **EARTH SCIENCE- 1 Unit- 9<sup>th</sup> grade**

*Earth Science Text: It's About Time, EarthComm*

Description: This is an introductory level inquiry based Earth Science course. The course will emphasize the combining of data analysis skills and inquiry-based exploration of fundamental Earth system concepts. Students will investigate the following major modules: the Earth's geosphere (lithosphere), the Earth's Fluid spheres (hydrosphere and atmosphere), the history and evolution of the Earth and the universe, and human impact on the Earth's environment and natural resources. Students use inquiry skills to investigate and design labs which aid in their understanding.

#### **CHEMISTRY – 1 Unit – 10<sup>th</sup> grade**

*Prerequisites: Completion of freshmen level lab based science course and Algebra 1*

This is a regular chemistry course at the college preparatory level. Motivation, an ability to work independently, a willingness to meet with the teacher outside of class if necessary, and competency in algebra are important for success. Topics include: traditional chemical analysis, industrial and biochemical reactions, the mole concept, oxidation/reduction reactions, basic organic chemistry, and nuclear chemistry. Laboratory exercises are included. Since the majority of the curriculum is applied with a focus on hands-on activities, this course will require active participation, discussion and the use of the scientific method.

#### **CHEMISTRY (Honors) – 1 Unit – 10<sup>th</sup> grade**

*Prerequisites: Completion of a freshman level lab based science course and Algebra 1, science recommendation, statement of interest and aptitude skills test*

This is an advanced college preparatory course in chemistry recommended for those students who have a strong interest in participating in more independent studies alongside chemical instruction. Students should have previously demonstrated above average abilities in deductive reasoning, computational skills, and abstract conceptualization. Topics include: modern atomic theory, the mole concept, chemical periodicity, oxidation/reduction

reactions, theories of chemical bonding in biochemical and industrial reactions, chemical energetics, acid-base reactions, rates of reactions, equilibrium, and nuclear chemistry. Laboratory exercises are used where appropriate. The majority of the curriculum is applied with a focus on hands-on activities. This course will require active participation, discussion and the use of the scientific method.

#### **BIOLOGY – 1 Unit – 10<sup>th</sup> grade**

*Prerequisites: Algebra 1, concurrently taking an additional math course and completion of 2 lab based science courses.*

This course provides exposure to several fields of biotechnology, including biomolecular genetics, bioprocess engineering, environmental and agricultural engineering, and biomedical engineering. Through real-world labs and simulations, students will apply biological and engineering concepts to design materials and processes that directly measure, repair, improve and extend living systems. Topics include safety and documentation, introductory biotechnical engineering principles, bioinformatics, alternative energy, environmental and agricultural engineering, and biomedical principles. Working in teams, students will gain experience in using Inventor 3D modeling software, and equipment such as ProScope, a portable forensic microscope, to document projects, solve problems, and communicate solutions to other students and industry professionals.

#### **PHYSICS – 1 Unit – 11<sup>th</sup> grade**

*Prerequisites: Algebra 1, concurrently taking an additional math course and completion of 2 lab based science courses.*

The first year physics course is an introduction to the concepts of Newtonian Mechanics. The focus is on understanding and being able to apply principles of linear and 2-dimensional motion, forces, Newton's Laws, energy, and circular motion. Emphasis is placed on discovery and hands-on learning. Student understanding is evaluated by performance on design projects as well as problem-solving.

#### **PHYSICS II – 1 Unit – 12<sup>th</sup> grade**

*Prerequisites: Algebra 1, concurrently taking an additional math course and completion of 2 lab based science courses.*

The second year physics course covers gravity, rotational mechanics, waves, sound, light and color, electrostatics, and currents and circuits, and magnetism. As with the first-year course, discovery, hands-on learning, and design projects are an important part of the curriculum, however there is more emphasis on use of mathematics as a tool for understanding the physical principles.

#### **MATERIALS SCIENCE & ENGINEERING – 1 Unit – 12<sup>th</sup> grade**

*Prerequisites: Algebra 1, concurrently taking an additional math course and completion of 3 lab based science courses.*

This course is an introduction to the principles of materials science, the study of the structure and properties of materials. Emphasis will be on materials and processes used in the building trades, including structural materials such as steel, concrete, ceramics, and wood, and on materials used in electrical, plumbing, windows, and other areas. Coursework will consist mostly of hands-on projects exploring the relationship between the process of manufacturing materials and their physical structure and properties.

## **Math Courses**

### **ALGEBRA I – 1 Unit – 9<sup>th</sup> grade**

This course introduces the language of Algebra where the focus is strengthening problem solving skills and mechanics while making connections to real world situations. Concepts taught in this course include algebraic properties, slope, polynomial equations, factoring, and linear systems.

Text: UCSMP Algebra: Integrated Mathematics (Prentice-Hall, Inc)

### **GEOMETRY – 1 Unit – 10<sup>th</sup> grade**

Geometry introduces and challenges those to find the mathematical patterns that occur in everyday life. The focus of this course will be on problem solving techniques applied to various geometric concepts including polygons, symmetry, three-dimensional figures, theorems/proofs, and the coordinate plane.

Geometry Text: Glencoe Geometry (2008) and College Preparatory Math (CMP)

### **HONORS GEOMETRY – 1 Unit – 10<sup>th</sup> grade**

The purpose of this class is to introduce, challenge, and inspire students to find the mathematical patterns that occur in every day life. Students will how to find correct answers using multiple methods, as well as problem solving techniques that are necessary for standardized tests. Furthermore, students will extensively use proofs in higher-level mathematics.

### **ALGEBRA II/TRIGONOMETRY – 1 Unit – 11<sup>th</sup> grade**

Algebra II is a branch of mathematics that focuses on the analyses of relationships between lines, angles, trigonometric functions and their applications. The emphasis of this course is on problem solving, reasoning, and communication of mathematical ideas in conjunction with understanding and connecting concepts.

Text: Algebra II (Holt, Rinehart, Winston)

### **ALGEBRA II WITH CONSTRUCTION APPLICATIONS – 1 Unit – 11 & 12<sup>th</sup> grades**

Algebra II/Trigonometry is a branch of mathematics that focuses on the analyses of relationships between lines, angles, trigonometric functions and their applications. The emphasis of this course is on problem solving, reasoning, and communication of mathematical ideas through demonstration of how fundamental math principles are used in the construction industry.

Text: Algebra II (Holt Rinehart Winston)

### **PRE CALCULUS – 1 Unit – 12<sup>th</sup> grade**

Pre Calculus is a rigorous mathematics course where the interconnection of mathematic topics and problem solving strategies are central. This course is designed to engage students in the learning of mathematics through exploration of various concepts including limits and continuity, functions, equations, inequalities, arithmetic and geometric sequences, and derivatives

Text: Pre Calculus: A Graphing Approach (Holt Rinehart Winston)

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## **Social Studies Courses**

### **ECONOMICS AND ENGINEERING – 1 Unit – 9<sup>th</sup> grade**

This course exposes students to the worlds of business, product development, manufacturing, technology, global wealth, and environmental policy. This course is designed to prepare students for post-secondary education and the workplace; explore techniques to build critical thinking, problem solving, communication, and teamwork; explore inquiry-and problem-based approaches to teaching and learning; and to link the classroom with real world applications. Students will apply their knowledge to solve problems, craft arguments, write persuasively, perform internet research, convey ideas to an audience, and

conduct presentations using technology. Website:

[www.fordpas.org](http://www.fordpas.org)

Texts: Ford PAS (Partnership for Academic Studies) Module 10 (Reverse Engineering), Module 5 (Closing the Environmental Loop), and Module 13 (Wealth of Nations)

### **WORLD HISTORY – 1 Unit – 10<sup>th</sup> grade**

Through the exploration of the culture, geography, and past and current events of different regions, World History will develop analysis, interpretation, and critical thinking skills. Students will develop their own perception of history with the study of historical documents, and film. Their unique perception will be represented in a portfolio containing journals, essays and projects completed throughout the year. World History and English II complement one another as the student enriches history through critical reading and analysis of novels.

Text: Glencoe World History, McGraw Hill 2005

### **US HISTORY – 1 Unit – 11<sup>th</sup> grade**

This course is designed to deepen each student's awareness of his/her American heritage and responsibilities as a citizen. Students will examine the development of the Constitution of the United States and the ways in which our government has evolved over time. All students are required to pass a test on both the U.S. and Illinois Constitutions. Student will engage in an examination of economic, intellectual, cultural, social, and environmental developments, as well as civil rights, labor issues and topics in foreign policy which have confronted citizens throughout various eras in our nation's history. Students will then evaluate the response of the government and individual citizens to these issues. In addition, students will develop skills in critical reading, issue analysis, and arguing point of view. Historical research is a year-long focus as each student prepares a cumulative research project.

Text: Ayers, Edward L., et al. *American Anthem*. Austin, TX: Holt, Rinehart and Winston, 2007.

### **WOMEN'S STUDIES – 1 Unit – Elective**

This *Women's Studies* course examines the many facets of female development from birth through old age. The student explores a variety of themes through the study of psychological concepts and literary selections. These themes include gender role development, adolescence, self-esteem, relationships, employment and career options, women's political power, and women's health issues. The goals of the course include the further refinement of written and oral skills, the identification of the variety of opportunities for women, and an appreciation for the diversity of women's experiences.

Text: Hyde, Janet Shibley. *Half the Human Experience: The Psychology of Women*. Seventh Edition. University of Wisconsin—Madison, 2007.

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## **Language Arts Courses**

### **ENGLISH WRITING – 1 Unit – 9<sup>th</sup> grade**

English 9 Writing will help students learn how to persuade and inform others through writing and speaking. The 1st marking period will tackle etymology, grammar, Letter Writing, and the ACE Persuasive Writing model. The 2nd marking period will deal with Business Writing with students working in groups to create a business, develop a business portfolio, and host a Mock Career Fair. The 3rd marking period will explore Research Writing by having students research an author and complete an Author Biography, Book Talk, and write a Letter to the Author. They will also participate in a Group Read Project where they will take character and chapter notes, create vocabulary and study questions guides, and give a presentation to the class. The 4th marking period will explore Creative Writing in the areas of poetry, short stories, memoirs, and speeches. Students will first analyze the

work of others and then complete their own Creative Writing Portfolio.

### **LITERATURE I – 1 Unit – 9<sup>th</sup> grade**

Through the exploration of genres, Literature I develops the skills of reading, composition, literary analysis, and oral communication. Students explore literature across genres by studying representative short stories, documentaries, essays, novels, poetry, drama, and film. Each student maintains a graduation portfolio containing their best work in order to track their progress in composition skills.

Texts: *Monster* by Walter Dean Myers, *Our America* by LeAlan Jones and Lloyd Newman, *Woman Hollering Creek* by Sandra Cisneros, *Lord of the Flies* by William Golding, *Romeo and Juliet* by William Shakespeare, *Catcher and the Rye* by J.D. Salinger

### **ENGLISH II – 1 Unit – 10<sup>th</sup> grade**

Through the exploration of world literature, English II further develops the skills introduced in English I: reading, composition, literary analysis, and oral communication. The student explores the cultural diversity of the world by studying representative historical documents, short stories, documentaries, essays, novels, poetry, drama, and film. The student maintains a portfolio of their best work in order to track their progress in composition skills. English II and World History complement one another as the student explores and interprets literature as historical artifact.

Texts: *The Kite Runner* by Khaled Hosseini, *Nectar in a Sieve* by Kamala Markandaya, *Macbeth* by William Shakespeare, *Things Fall Apart* by Chinua Achebe, *Night* by Elie Wiesel

### **AMERICAN LITERATURE – 1 Unit – 11<sup>th</sup> grade**

This class is a study on American Literature and the American Dream. To simplify this year, I have chosen 3 areas of focus and essential questions for each area. Through presentations, group and individual work, tests, and papers, you will be able to answer each question and relate it to the novels we will be reading.

### **HONORS AMERICAN LITERATURE – 1 Unit – 11<sup>th</sup> grade**

American Literature will take a decidedly multicultural look at the creation and development of the “American” as portrayed through a variety of sources. We will specifically examine historical documents, short stories, essays, memoirs, novels, plays, music, and film to provide evidence of the American evolution. The skills that will be required to excel in this class are reading, literary analysis, verbal communication and debate, multiple forms of composition, and finally and most importantly an OPEN MIND!

The students will also be required to develop and maintain a portfolio that will track and show progression through the class.

Texts: *Their Eyes Were Watching God* by Zora Neal Hurston, *The Things They Carried* by Tim O’Brien, *An American Story* by Debra Dickerson, *The Crucible* by Arthur Miller, *The Jungle* by Upton Sinclair, *My Antonia* by Willa Cather, *The Great Gatsby* by F. Scott Fitzgerald

### **COLLEGE WRITING – 1 Unit – 12<sup>th</sup> grade**

Capstone for Language arts focusing on the writing aspects of the college application process, teaching students to think critically, articulate viewpoints, and provide an effective analysis through writing. All students will develop college and career portfolios that include formal research papers and career related writings.

Text: Associated Press Stylebook.

### **JOURNALISM – 1 Unit – Elective**

This course is an introduction to newspaper writing and editing resulting in the production of a school newspaper and yearbook.

Texts: *Journalism Today* and Associated Press Stylebook.

## **ACE Career Concentration Courses**

### **PRINCIPLES of ENGINEERING – 1 Unit – 11<sup>th</sup> grade**

*Prerequisites: Algebra 1, concurrently taking an additional math and lab based science course, completion of 2 lab based science course.*

Principles of Engineering is a course taught in partnership with Project Lead the Way, a national organization that promotes pre-engineering education in secondary schools. The course introduces students to the concepts and practice of engineering. Students work in teams to accomplish tasks with real-world applications. In the process, they learn how to design and build operational devices and systems, as well as learning how to use important tools, such as computer-aided design, control systems programming, and basic principles of mechanical engineering.

### **CIVIL ENGINEERING AND URBAN DESIGN – 1 Unit – 12<sup>th</sup> grade**

Civil Engineering and Urban Design is a college prep class designed for 12th graders. The primary purpose of this class is for students to understand how city is structured and designed through science, and how a city is structured and designed by human behavior, environment, and social priority. Students will learn about Civil Engineering in classroom based and hands on construction, with particular emphasis on Reavit drafting software, surveying equipment, soil testing, building codes, building and site components, and utilities and building design. Students will develop knowledge through project-based learning.

Text: of this class is the curriculum provided by Project Lead the Way (PLTW). They have a unified curriculum and website.

### **MANUAL DRAFTING – 1 Unit – 9<sup>th</sup> grade**

Through the exploration of basic architectural elements, architectural drafting develops the fundamental drafting skills which allow students to communicate graphically. The ability to measure objects or spaces precisely, using a ruler, architectural scale or measuring tape is a major focus of this drafting course. Upon demonstration of the ability to take accurate measurements, students will learn how to manually produce 2-dimensional and 3-dimensional drawings accurately from measurement. However, in addition to being able to communicate graphically, students will develop the skills necessary to give clear and concise oral presentations.

### **ARCHITECTURE AND AUTOCAD – 1 Unit – 10<sup>th</sup> grade**

Construction Documents are significant to any form of visual communications within the building industry. First we must understand how to read basic floor plans and then learn how to use the basic tools provided by AutoCAD. We will practice how to sketch, draft and then implement these onto the computer. We will also explore the relationship of the city of Chicago, its neighborhoods, as well as other valuable assets that the city provides to analyze visual properties. The computer will be used as a main tool to create, manipulate and transform drawings. We will evaluate our hand drafting skills and recreate our sketched and drafted illustrations into computer aided drawings.

### **ADVANCED ARCHITECTURE I – 1 Unit – 11<sup>th</sup> grade**

Advanced Architecture I is a required course for junior students that have chosen Architecture as a concentration at ACE Tech Charter High School. Students begin the course practicing intermediate computer drafting techniques that will be utilized to successfully complete professional design projects throughout both semesters. Throughout the year Advanced Architecture I also focuses on basic construction techniques which give students an understanding of how residential buildings are constructed. Students will be able to produce two dimensional CAD drawings of floor plans, elevations, and sections at the completion of this

course. Advanced Architecture I is a requirement for Advanced Architecture II.

### **ADVANCED ARCHITECTURE II – 1 Unit – 12<sup>th</sup> grade**

Advanced Architecture II is a required course for Senior Students that have chosen Architecture as a concentration at ACE Tech Charter High School. In this course students are given large scale city and regional planning projects that involve more than just the study of buildings. Students are challenged to study different neighborhoods and environments to solve problems that result in three dimensional CAD models, plans, elevations, and detail drawings. Advanced Architecture II is a college preparatory course for students that are considering studying Architecture at the university level.

### **GREEN ARCHITECTURE– 1 Unit – Elective**

In this course students begin learning about the different materials and energy sources that are harmful not only to our bodies, but to our immediate environment and to our planet. Once these toxic materials and energy sources are identified, an investigation develops on solutions that focus on ways to protect our environment in the way we construct buildings and spaces. Students are required to create sustainable designs using AutoCAD, and produce physical study & final models for presentations. Throughout the course students will also visit building examples around Chicago that demonstrate green architecture, sustainable design, and hybrid homes.

### **BUILDING TRADES – 1-3 Units – 9-12 Grades**

Students will explore the different aspects of the construction industry, learning about potential careers in different trades areas. This will be supported by hands on projects in different construction disciplines, providing students with tangible skills for entering the construction sector.

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## **Foreign Language Courses**

### **FRENCH I – 1 Unit – 10-11<sup>th</sup> grades**

The purpose of this class is to introduce students to the French language and culture. Students will learn how to read, write, and speak the language while studying why people around the world speak and study it.

### **FRENCH II – 1 Unit – 11-12<sup>th</sup> grades**

The purpose of this class is to enhance student knowledge of the French language and culture. Students will practice reading, writing, and speaking the language while studying why people around the world speak and study it.

*\*French Texts: EMC Paradigm, C'est à Toi (2nd Edition)*

### **SPANISH I – 1 Unit – 10-11<sup>th</sup> grades**

This introductory course has three main goals: for students to communicate in Spanish, gain an appreciation of Spanish and Latin American cultures, and to make connections to other disciplines. Text: Expresate, (Holt Rinehart & Winston Publishers 2006).

### **SPANISH II– 1 Unit – 11-12<sup>th</sup> grades**

This course focuses in the instruction of basics skills in the Spanish language. Students will be taught important elements of language learning, which they will apply in this class. Upon completion of this course, students will have a well rounded introduction to the world of Spanish.

Text: EXPRESATE: SPANISH LEVEL 1© 2006 by Holt, Rinehart & Winston

### **ADVANCED SPANISH II– 1 Unit – 11-12<sup>th</sup> grades**

This course is designed to explore beyond the basic knowledge of Spanish. Students will be expected to complete more rigorous tasks in the areas of: grammar, literature, composition and verbal skills. In order to accomplish this we will use higher levels of learning such as: analysis and synthesis. Upon completion of this course, students will have a higher knowledge and awareness of the target language by improving their reading, writing and verbal skills.

Text: Tu Mundo: Curso Para Hispanoablantes\_© 2002 by McDougal Littell

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## **Electives**

### **ADVANCED ART – 1 Unit – Elective**

This course continues the exploration of drawing and painting. We will explore many themes and work with many different mediums. We will work from still life and other subject matter while exploring line, shape, space, and value. In the second semester we will work with color, and painting techniques. Self-expression and participation will be encouraged and expected.

### **BUSINESS – 1 Unit – Elective**

This course focuses on entrepreneurs, entrepreneurial ventures, and the entrepreneurial process through case study and development of a formal business plan. The course looks at how entrepreneurs develop innovative strategies aimed at goal achievement by effectively linking internal core competencies to external competitive advantage.

### **INFORMATION TECHNOLOGY – 1 Unit – 9<sup>th</sup> grade**

This course is a broad introduction to the use of computers as tools for creativity, communications and organizing information. We at Ace do not assume that you have any previous computer experience, but even those students who are already advanced computer users will find activities to challenge them. In addition to learning the technical fundamentals of computer use, we hope to help you build your skills in researching information, making appropriate ethical choices about the use of computers, and using technology to help you learn on your own and pass your new skills on to others.

### **PERSPECTIVE DRAWING– 1 Unit – Elective**

An introduction to the vocabulary and basic concepts of design: contrast and harmony; balance and applying texture; linear, symmetry-asymmetry; geometric and clustering forms of organization. Exercises developing creativity, and manual skills to cope with design, development of visual values for structuring and articulating 2D and 3D compositions in different media

### **PHOTOGRAPHY– 1 Unit – Elective**

We will explore the world of photography. We will learn about the many features of a digital camera and how to manipulate to create beautiful images. We will learn how to use digital software such as Photoshop to manipulate, retouch, and organize our photographs. We will also learn about different photographers and their work. The course will concentrate on photographer's techniques including studio lighting.

### **PIANO – 1 Unit – Elective**

This course is designed to teach students the basics of playing the piano and educate them on key historical and contemporary composers. By the end of the year, students should be able to read music and play late beginner/early intermediate piano pieces. Students learn to play the piano on digital keyboards, and as the instructor, I communicate with students through headsets. Tests are performance based, quizzes are written and based on theory, and homework assignments are taken from theory exercises relevant to

each unit. Overall, the class will be divided between instruction time, and individual/group practice time.