

*Bergen County  
Academies  
Course  
Catalogue*

# BIOLOGY

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***Biology - 9 (H) AMST/ABFIB (Core) Full Year:***

**Course Description:**

General Biology is a comprehensive course that covers the fundamental and current topics in the biological sciences. It begins with a discussion of the nature of science and the scientific method of solving problems, thus allowing for the student to appreciate all aspects of biology, the study of life. The course goes beyond the textbook, dealing with the newest discoveries in the biotechnology realm. Field trips may be planned throughout the year to supplement content.

### **Specific Objectives:**

After completing this course the student will:

- Understand biology as a basic science.
- Learn the basic energetic including metabolism, biochemistry, photosynthesis, and cellular respiration.
- Discuss the concepts of cell biology and cell division.
- Understand the concepts of genetics, heredity, evolution and how we adapt to our changing environment.
- Be familiar with the ecological relationships of plants and animals

### **Topics Covered in Curriculum:**

- The Science of Life
- Chemistry of Life
- Biochemistry
- Cell Structure and Function
- Homeostasis & Cell Transport
- Photosynthesis
- Respiration
- Cell Reproduction
- Fundamentals of Genetics
- DNA, RNA, & Protein Synthesis
- Theory of Evolution
- Population of Genetics and Speciation
- Classification of Organisms
- Introduction to Ecology

### **Chapters Covered if Time Permitting**

- Skeletal, Muscular and Integumentary Systems
- Circulatory and Respiratory Systems
- The Body's Defense Systems

- Digestive and Excretory Systems
- Nervous System and Sense Organs

**Text Book:** Campbell Biology, Concepts & Connections (2015), by Reece, Taylor, Simon, Dickey, & Hogan, Eighth Edition, Pearson (both hardcopy and on-line version).

### ***Biology - 9 (H) ACAHA, ATCS, AVPA (Core) Full Year***

The core course, Honors Biology, is an investigation of the most important biological topics in modern life and their everyday applications. The course is a requirement for all first year students in the ACAHA, ATCS, and AVPA Academies. It investigates the composition, diversity, complexity and interconnectedness of life on Earth. Fundamental concepts of cells, heredity, evolution and ecology provide a framework through inquiry-based instruction and laboratory experience, direct instruction and technology to explore the living world, the physical environment and the interactions within and between them. Students develop an understanding of the study of life, chemistry, and biochemistry. They explore topics including cell biology, homeostasis, photosynthesis, and cellular respiration. Towards the end of the year, students explain difficult concepts including cell replication, systematics, natural selection and ecology. Students will cover all topics that they will be tested on the annual Biology Competency Test (NJBCT) developed by the State of New Jersey. After the exam, students will complete their study with a final project relating biology with their everyday lives.

Students will be taught primarily through in-class discussions, hands-on demonstrations, laboratory practicum, and creative projects. Throughout the course, students will be encouraged to work in groups of 2-4. Students will also be encouraged to think critically, learn effective group work, be creative, and present effectively. The course of study includes: Foundations of Biology, Cell Biology, Genetics, Evolution, and Ecology. Throughout the course, students will be assessed via quizzes/tests, laboratory exercises, major projects and of homework assignments.

**Text Book:** Campbell Biology (2015), by Reece, Taylor, Simon, Dickey, & Hogan, Eighth Edition, Pearson (both hardcopy and on-line version).

## *Medical Science Seminar [MSS] - 9 (H) AMST (Core) Full Year*

This AMST freshman course is comprised of three one-trimester rotation courses. The student body is divided into three sections and at any one time each section is taking a different course.

By the end of the year, each section has taken all three rotation courses.

### *Medical Science Seminar Rotation Course 1: Epidemiology*

Epidemiology is the study of the distribution and determinants of health related states or events in specified populations, and the application of this study to the control of health problems. In other words, why some get sick and some don't. The following seven ideas are stressed: methods, frequency, distribution, determinants, disease, populations, and prevention. Therefore, epidemiology consists of the methods used to study the frequency, distribution, and determinants of disease in populations, so that the disease can be prevented.

Historically, courses in epidemiology have been offered to graduate students in health-related programs. There has been some recognition of the value of teaching epidemiology to younger students. The Centers for Disease Control and Prevention has strongly advocated the integration of epidemiology teaching in grades K-12. This fairly high-level course is offered to freshmen within AMST as a core course.

The entire course is taught from PowerPoints developed by Dr. Pergolizzi. These are sent to the students as a zipped file. All tests are taken from these PowerPoints.

The course of study includes:

- How is this disease distributed and what hypotheses might explain that distribution?
- Is there an association between the hypothesized cause and the disease?
- Is this association causal?
- What should be done when preventable causes of disease are found?
- Did the disease prevention strategy work?

Students are assessed using exams, quizzes and papers, with a large group project mid-trimester. The group is asked to pick a topic and perform a "clinical trial" by asking BCA students specific questions and tallying the

results. The results of their studies are presented in class.

### ***Medical Science Seminar Rotation Course 2: Pharmacology***

Pharmacology is the science of drug action on biological systems. This course provides students with information essential to the understanding of fundamental concepts in Pharmacology such as pharmacokinetics, pharmacodynamics, and pharmacogenomics. Topics such as routes of drug administration, naming drugs, and clinical trials are investigated. Certain therapeutic conditions are discussed in order to provide an understanding of the basis of drug therapy. Each topic is addressed through use of relevant laboratory activities and lecture as well as relevant "WebQuests." Student participation, projects, experiments, group work, tests, classwork, and homework play an integral part in the students developing an understanding of the topics of the one trimester Pharmacology course. The course is designed to meet the National and New Jersey Science Curriculum Framework. The New Jersey Standards are referenced throughout this document- as are the Workplace Readiness Standards, which are mandated by the State Department of Education.

### ***Medical Science Seminar Rotation Course 3: Introduction to Experimental Design***

The goal of this course is to enable students to understand the basic components of scientific research, which include identifying a problem, investigating what research has already been done, planning an experiment, collecting and analyzing data, and drawing conclusions. Students will also learn how to utilize some basic statistical methods. The culmination of this course is to conduct a scientific experiment and generate a scientific research presentation. Field trips may be taken in order to solidify course concepts.

Texts: There are no texts for this course. Students are expected to do a literature search once they have decided on a research topic.

Articles and other media used include: Factors affecting germination of hairy nightshade (*Solanum sarrachoides*) seeds *Weed Science*, Vol. 53, No. 1 (Jan. - Feb., 2005), pp. 41-45 Jingkai Zhou, Edward L. Deckard, William H. Ahrens And <http://www.learner.org/resources/series65.html> as well as others.

## ***Biology - 9 (H) AAST/AEDT (Core) Full Year***

The Honors Biology course is comprised of a comprehensive and challenging curriculum that supplies a solid scientific foundation for the student to build on in future science classes. This course is required of the AAST and AEDT students and is taken during the 9th grade. Core concepts are explored, as the student develops critical thinking and problem solving skills, while investigating how Biology relates to the student's life and community. During this year long course students will have many opportunities for hands-on exploration through weekly laboratory assignments, modeling activities, media and technology and assigned readings. Educational field trips may be taken during the year to solidify concepts covered in class.

Themes are major concepts that link facts and ideas together. They act as the support beams of a cognitive framework, on which the facts, theories and other elements of scientific knowledge are assembled and organized. Major themes covered in Honors Biology include: The Scope of Biology, The Process of Science, The Molecules of Life, Cell Structure and Function, Cellular Energy, and Cellular Reproduction and Inheritance.

Extended time lab periods support the Honors Biology curriculum covering topics that include the implementation of the scientific method, bacteriology, the identification of plant pigments and the proper use of instrumentation.

**Resources:** Biology: Concepts and Connections (8th Edition)-hardcopy and online  
Campbell's AP Biology (9th Edition) - online

## ***Advanced Biology - 10 (H) AAST/AEDT (Core) Full Year***

The core courses Honors Biology and Advanced Biology at the Academy comprise a two-year investigation of some of the most critical biological topics in modern life. They are required of the students in the Academy for Advancement of Science and Technology and the Academy for Engineering Design Technology during the 9th and 10th grades. These courses comprise a comprehensive sequence that covers the major concepts in Biology and their applications. The 10th grade curriculum provides students with coverage of traditional, time tested topics and the latest in scientific thought. Scientific literacy is one of the most important

goals of the curriculum because of its increasing importance in the workplace. Each unit provides students with a wide range of engaging laboratory activities that require students to critically examine the world in which they live. The curriculum consistently places practical experience in the proper conceptual context realizing that students learn by doing. The primary emphases of Advanced Biology are cell reproduction, fundamentals of genetics, nucleic acids and protein synthesis, gene expression, inheritance patterns and human genetics, DNA technology, evolution: evidence and theory, ecology as a multidisciplinary science and alternative energy sources. The first trimester emphasis will be on cell reproduction and genetics, while the second trimester will focus on human genetics, DNA technology and evolution. During the third trimester, the concentration will be on ecology, explaining how co-evolutionary accommodations among organisms living together create the web of relationships responsible of ecosystem stability. The year will end with the introduction of alternative energy sources in order to preserve the delicate balance that exists in the environment. Trips are planned to expand student ideas and solidify concepts learned in class. Classroom activities include multimedia instruction, hands-on experiences using laboratory equipment, open-ended investigations both group and individual, and opportunities to observe organisms of all domains. Background reading, research, information and data analysis play an integral part in students developing an understanding of the structure of the Biology course. The course is designed to meet the National and New Jersey Science Curriculum Framework.

**Resources:** Biology: Concepts and Connections (8th Edition)-hardcopy and online  
Campbell's AP Biology (9th Edition)- online

### ***Agricultural Science Research [Ms. Kennedy] - 9 10 11 12***

This year long research program is open to all students in all academies. The prerequisites for entering the program include the one-trimester electives Introduction to Agriscience and Agricultural Research Methods during which the students learn the basics of this field of study, begin to identify a research topic of interest, and learn the skills needed for the equipment and organisms that will be utilized in their research. Experimental research in Agricultural Science includes the areas of

sustainable food-fiber-fuel production, horticulture, natural resources, ethnobotany, hydro- and aquaponics, and epidemiological studies impacting modern agriculture; therefore the research project can reflect a topic relevant in each of the Academies. Experimentation may include use of the greenhouse facilities, and appropriate technological laboratory equipment such as that found in commercial agricultural research laboratories. The student, or student pairs, will schedule adequate time with the teacher to conduct the research. Membership in the BCA FFA student organization is required so that student researchers may participate in the NJ FFA Agriscience Fair as their culmination. Other competitive events (such as ISWEEEP, YSAP, and NJAS) are also open to students completing a project.

### ***Anatomy and Physiology - 11 (H) AMST (Core) Full Year***

Anatomy and Physiology, the study of the structure and function of the human body, is necessary as a basic science prerequisite for students seeking careers in the medical field. This course, which will also include basic chemistry, biochemistry, and histology, is designed to give the students a selective overview of human anatomical structure and an analysis of human physiological principles by following a sequential study of the major body systems in an organized and structured curriculum. There will be extensive laboratory activities that accompany each unit under study. Units will include: characteristics of life, levels of organization, chemistry, biochemistry, cells, integumentary system, skeletal system, muscular system, nervous system (including the eye and ear), endocrine system, lymphatic and immune system, cardiovascular system (including the blood), respiratory system, digestive system, urinary system, and the reproductive system and embryology. Emphasis will be placed on the application of knowledge and skills from previous science classes to the study of human anatomy and physiology.

**Required textbook:** Hole's Essentials of Human Anatomy and Physiology 8th ed. 2003, by Shier, Butler, and Lewis and online resources for this textbook.

### ***Biotechnology Lab - 10 (H) AMST (Required) One Trimester***

This one trimester biotechnology lab is designed to teach basic laboratory and biotechnology skills to 10th graders. One third of each sophomore AMST class takes this course each trimester such that by the end of the academic year all AMST students have completed this course. The course provides the skills and knowledge that will enable the student to intern in professional labs. Students satisfactorily completing this course will have an understanding of basic laboratory procedures. They will learn fundamental skills such as electrophoresis, bacterial transformation and PCR, each of which provides the basis for much of relevant biotechnology research. Ethical ramifications of gene technology will be discussed and gene technology and its impact on student lives will be explored. This is a lab course, without a lecture component, with most of the work being carried out using a hands on approach. Emphasis will be placed on safety, accurate measurement, and recording of data. Students will be in lab groups of two to three. Cooperative learning will be the norm. Labs will be evaluated based on criteria specific to the particular lab consisting of assessment of work being done (e.g. accurate measurements, or proper results achieved), satisfactory completion of assigned discussion/follow-up questions, and proper manipulation and analysis of lab data (e.g. making a graph or an accurate restriction site map). The primary grade will be the assessments of the student's notebook. Quizzes on material will be given on an as needed basis. The general format of the weekly three hour period will be as follows: Approximately 20 minutes to discuss lab procedures, followed by two hours of lab work, and finishing with 20 minutes of discussion and suggested approaches to analysis. Students will be expected to do a considerable amount of outside reading to prepare for the lab work. In addition, much of the analysis work must be done outside of class. Students must be very motivated with an internal drive.

**Primary texts:**

Introduction to Biotechnology, William J. Thieman, Michael A Palladino. Benjamin Cummings 2004

Biotechnology Explorations: Applying the Fundamentals, Judith A. Scheppler, Patricia E.

Cassin, Rosa M. Gambier. ASM Press 2000

Various Biotechnology Explorer manuals published by Bio-Rad  
[explorer.bio-rad.com](http://explorer.bio-rad.com)

Various Video Tutorials and demonstrations such as;

<https://www.youtube.com/playlist?list=PLE040E80C872E47CF>

### ***AP Biology - 12 (Elective) Year long***

Upon completion of the AP biology course students are well prepared to take the AP Biology Exam. Twelve required AP labs are completed as well as additional labs. This course is an elective open to students from all academies. It is a year-long class, and traditionally taken during the senior year. It is recommended that students have a strong background in biology or the lab sciences before taking AP biology. Students find the pace of the class challenging. The class meets four hours a week. Class formats include lecture/discussion, cooperative group work, simulations, and lab work. Students are expected to read 2-3 chapters of text a week. Labs are done on a regular basis. Students must maintain a lab notebook and prepare lab reports. Tests are given twice a trimester. Each test covers 7-10 chapters. The focus of the course will be to cover the topics looking at unifying themes in biology (emergent properties, evolution and diversity, form and function, science as a process) and ethical implications for science and society. Subject areas that are covered include: chemistry of life, cellular anatomy and physiology, evolution, classification and diversity of life, genetics, plant anatomy and physiology, animal anatomy and physiology, ecology. Some of the labs are investigations of: enzyme reaction rates, fruit fly genetics, population genetics and transpiration. Student participation, projects, experiments, group work, tests, classwork, and homework play an integral part in the students' developing an understanding of the structure of the subject material. The course is designed to meet the National and New Jersey Science Curriculum Framework.

**Textbook:** Life: The Science of Biology 10th ed. Sadava. Hillis, Heller and Berenbaum 2008 ISBN-978-1-464/-1-4157-7

**Field Trips:** During the year, field trips may be taken to help in solidification of concepts presented during the course.

### ***AP Psychology - 12 (Elective) Year Long***

The primary emphasis of AP Psychology is to investigate how humans, and other animals, act; how they know; how they interact; how they

develop; and how they differ from one another. Because of its advanced nature and depth of coverage, the AP level of this course assumes prior knowledge in all of the sciences and is thus offered only to seniors. It is expected that students of AP Psychology have already taken chemistry, physics, and at least one year of biology at BCA. Psychology is the science of behavior, and this course represents a fusion of several fields of science as they contribute to our understanding of behavior. The material for this course will be covered at a level that is comparable to any university level introductory psychology course. AP Psychology is taught for the entire year. Students are expected to take the entire 3-trimester course. Student participation, projects, experiments, group work, tests, classwork and homework play integral parts in the students' developing an understanding of the material covered in the course.

**Textbook:** Psychology, 8th Ed., by Gleitman, Gross & Reisberg (WW Norton & Co., 2011)

### *IB Environmental Systems and Society - 11 & 12 (Elective) Year Long*

The Environmental Systems & Societies course requires a diverse set of skills from its students. It is firmly grounded in both a scientific exploration of environmental systems in their structure and function and in the exploration of cultural, economic, ethical, political, and social interactions of societies with the environment. As a result of studying this course, students will become equipped with the ability to recognize and evaluate the impact of our complex system of societies on the natural world. The interdisciplinary nature of the course requires a broad skill set from students and includes the ability to perform research and investigations and to participate in philosophical discussion. The course requires a systems approach to environmental understanding and problem-solving, and promotes holistic thinking about environmental issues. It is recognized that to understand the environmental issues of the 21st century and suggest suitable management solutions, both the human and environmental aspects must be understood.

Through the exploration of cause and effect, the course investigates how values interact with choices and actions, resulting in a range of environmental impacts. Students develop an understanding that the connections between environmental systems and societies are diverse,

varied and dynamic. The complexity of these interactions challenges those working towards understanding the actions required for effective guardianship of the planet and sustainable and equitable use of shared resources.

The course is divided into eight major topics:

Topic 1. Foundations of Environmental Systems & Societies

Topic 2: Ecosystems & Ecology

Topic 3: Biodiversity & Conservation

Topic 4: Water & Aquatic Food Production Systems & Societies

Topic 5: Soil Systems & Terrestrial Food Production Systems & Societies

Topic 6: Atmospheric Systems & Societies

Topic 7: Climate Change & Energy Production

Topic 8: Human Systems & Resource Use

**Textbook:** Environmental Science: A Study of Interrelationships by Enger & Smith (2010), 12th Edition.

## **Assessment**

**Internal assessment:** Individual investigation; Duration: 10 hours;  
Weighting: 25%

The individual investigation will be a single task taking about 10 hours.

The purpose of the internal assessment investigation is to focus on a particular aspect of an ESS issue and to apply the results to a broader environmental and/or societal context. The investigation is recorded as a written report that should be 1,500 to 2,250 words long.

**External assessment:** Includes two papers.

*Paper 1:* Duration - 1 hour; weighting - 25% (Total Points = 40)

Students will be provided with a range of data in a variety of forms relating to a specific, previously unseen case study. Questions will be based on the analysis and evaluation of the data in the case study. All of the questions are compulsory. The questions test assessment objectives 1, 2, & 3.

*Paper 2:* Duration - 2 hours; weighting - 50% (Total Points = 65)

Paper 2 consists of two sections, A and B. Section A (total points = 25) is made up of short-answer and data-based questions. Section B requires students to answer two structured essay questions from a choice of four.

Each question is worth 20 marks. The questions test assessment objectives 1, 2, & 3.

***Advanced Topics in Medicine, Rotation 1: Neuroscience - 10 AMST (Required) One Trimester***

Neuroscience is a core course for AMST Sophomores. This class meets twice per week and provides an in-depth background in a select area of metabolism and neuroscience. Neuroscience covers electrophysiology of neurons, spinal cord, spine and autonomic nervous system. Students are assessed via major homework projects including current events summaries and take home exams.

This course is designed to explore the development, comparative anatomy, organization and physiology of the mammalian nervous system, with emphasis on the human brain. Topics include the anatomy and function of the nervous system, sensory and motor systems, control of movement, learning and memory, neurotransmitters, neuropathology and techniques used in imaging the brain.

1. The Human Nervous System : Brain, Spinal Cord, Cranial and Spinal Nerves, Senses
2. Histology
3. Development of the Nervous System- Embryology
4. Reflexes and Perception
5. History of Neuroscience- How we know what we know
6. Neuropathology - Case Histories
7. Neurotransmitters and pharmacology
8. Mapping the Brain
9. What is consciousness, and where does it live?

***Advanced Topics in Medicine, Rotation 2: Bioethics – 10 11 12 AMST (Required) One Trimester***

Bioethics is the application of ethics to the fields of medicine and research and is a required elective for all students in AMST. This course is multidisciplinary, blending law, philosophy, insights from the humanities and medicine to bear on the complex interaction of human life, science and

technology. By addressing significant questions, such as the ends and purposes of the life sciences, healthcare, the meanings and implications of distributive justice, and issues in global healthcare, it also explores deeper issues such as the meaning of life and death, pain and suffering, and rights and responsibilities. The case study method is used to stimulate the moral imagination, develop ethical perception, enhance analytical reasoning skills and elicit a sense of personal responsibility

**Resources:**

Selected readings from *New Choices, New Responsibilities: Ethical Issues in the Life Sciences*, *An Ethics Primer - NWABR*, and *Legal and Ethical Issues for Health Professionals - Jones and Bartlett*. High School Bioethics Project at the University of Pennsylvania Center for Bioethics.

***Advanced Topics in Medicine, Rotation 3: Zoology - 10 11 12 AMST (Required) One Trimester***

This one trimester course is the study of animal life. In this course the students will be introduced to the various phyla in the Kingdom Animalia. Particular emphasis will be on the evolutionary development of biological systems and environmental adaptations. Several major themes in Zoology will be woven throughout the progression of the course. They include systems and interactions, unity within diversity, homeostasis, and evolution. Students will have many opportunities for hands-on exploration such as animal behavior labs, regeneration of planaria experiments and various dissections. In most cases students will be working with partners. Students should have a binder to hold all handouts, assignments, and notes as a portfolio of their laboratory reports and drawings will be submitted at the end of the trimester. Grades will be based on homework, presentations and course notebook that will include notes, drawings, collected data and analysis. During the trimester we may take field trips to solidify course concepts.

**Texts:** Various online resources are used for instance [www.biointeractive.org](http://www.biointeractive.org) and <http://www.biologycorner.com/worksheets.html>  
<http://www.biologycorner.com/worksheets.html>

***Psychology Research [Dr. Kenny] - 10 11 12 (Elective) Year Long***

Students who wish to conduct independent behavioral research at BCA are invited to discuss potential research topics with Dr. Kenny. Studies are designed with ethical considerations in mind and according to the limitations imposed by restricting research possibilities to high school students (usually), and conducting this research during school hours. Any study conducted is first submitted to FDU's Institutional Review Board for approval.

### ***Research in Cell Biology and Medical Science - 9 10 11 12 (Elective) Year Long***

*Cell Biology and Medical Science* is an elective course for students who have completed *Experimental Science* as part of the 9th grade AAST curriculum or *Experimental Science* as part of *Medical Science Seminar*. It is intended primarily for those students seeking to carry out research in cell biology and/or medical science and is a prerequisite for research in Mrs. Leonardi's laboratory. This course meets 6 mods per week. The overall focus of the course is to develop an understanding of how to design a scientific experiment as well as become proficient at several laboratory techniques.

Most importantly, this course is a laboratory-based course in which the student will learn laboratory techniques by carrying out experiments that have been modeled from the scientific literature. The idea of learning cell biology techniques, data collection, interpretation and presentation as well as statistical analysis is the primary goal of the course. Utilization of various pieces of equipment common to a cell biology research laboratory will enable students to attain a level of comfort when embarking on their independent research projects. Students will learn eukaryotic and prokaryotic cell culture techniques.

This course also explores the steps necessary in the design of an individualized research project in an area of interest to the student. By the end of the first trimester the student will have the necessary groundwork completed to begin the hands-on research project. Also, as a result of participating in this course, the students will gain a level of proficiency in navigating the scientific literature, learn about the structure of a scientific paper, and visualize various ways to present data.

## ***Bio Research Lab [Mrs. Leonardi] -10 11 12 (Elective) Year Long***

In the Bioresearch program in the Laboratory of Cell Biology and Medical Science, the students carry out independent and team research projects. These projects are often derived from the proposals prepared in the pre-research courses taken before entering the lab. These unique projects demonstrate an understanding of the scientific method by encouraging the students to demonstrate proficiency in:

- Formulating a hypothesis
- Designing an experimental protocol
- Carrying out an experiment and collecting data
- Analyzing data using tables and graphs
- Interpreting the results
- Writing an abstract and scientific report
- Understanding how to organize and give a computer slide presentation of the study
- Presenting the study at one of the various science symposiums

While most research in the lab is in the area of cell and molecular biology, the particular type of research carried out in the laboratory includes projects involving the elucidation of signal transduction pathways, the use of shRNA and miRNA, stem cell biology, as well as microbiology experiments and assays in botany. All projects are Biosafety Level 1. Emphasis is placed on developing critical thinking skills and 21st century lab skills. Interaction with outside experts is encouraged and global communication is promoted as well as field trips to promote the incorporation of advanced technical skills into the lab.

## ***Research Applications in Molecular Biology Genetics [RESMOL] - 9 10 11 12 (Elective) Year Long***

The goal of the Research Applications in Molecular Biology and Genetics Program [RESMOL] is to enable a student to learn how biologists and other scientists work as researchers. Students will learn how to devise and define research questions and hypotheses, how to acquire and analyze data, and how to report results orally and in writing. This knowledge will be acquired by mastery of the five phases of a research project.

The first half of the course serves as an introduction to the major current topics in genome and stem cell research; the second half deals with the instrumentation in the stem cell lab and the kind of data that each instrument can generate. The students work throughout the course on perfecting a research project outline that they can perform when they pass the pre-requisite. These may include: Introductory, Methods, Results, Discussion, and Presentation. This course is a pre-requisite for research with Dr. Pergolizzi. The course of study may include:

- The Scientific Method
- Data Analysis and Statistics
- Hypotheses and Rational Experimental Design
- Preparing for the Individualized Research Project

The main assessment in this course is the research project paper. Students can submit as many revisions as they wish until the end of the course. There are no textbooks used in this class, but there are readings from the scientific literature.

### ***Bio Research Lab [Dr. Pergolizzi] - 10 11 12 (Elective) Year Long***

The goal of the Biological Research Program is to enable a student to develop data based on the project they proposed in the prerequisite for this course (Research Applications in Molecular Biology and Genetics, aka RESMOL). RESMOL is mandatory for students who wish to work with Dr. Pergolizzi. Students learn how to identify and apply resources to approach their research questions and hypotheses, how to acquire and analyze data, and how to report results orally and in writing. It is anticipated that once a student begins research, they will continue to continue for as many trimesters as possible. To encourage the development of complex projects and to give students the maximum time possible to perfect their art, freshmen are now permitted to take RESMOL and to begin their project work as early as possible.

This is a non-traditional course in that all students work on independent projects of their own design. Although group projects were not encouraged in the past, recent changes to the rules governing the large scholarship competitions (Siemens and Intel) have now been changed, and our policy regarding group projects has been modified to reflect these changes. Assessments are provided in the form of ongoing oversight and criticism of the project. Each student is expected to develop a presentation

for the North Jersey Regional Science Fair (NJRSF) in March, and the quality and professionalism of these presentations is also assessed. There are no textbooks used in this class, but there are frequent personalized readings from the scientific literature.

To accommodate the scheduling difficulties that often interfere with research during the school year, a summer program (4 weeks in July) is offered for a fee. During this program the student has all day (8AM-2PM) to work on their projects with no other distractions.

### ***Introduction to Microscopy - 9 10 11 12 (Elective) Year Long***

Looking for a science elective to set you apart...how about one that most high school (and even college) students aren't able to take? Intro to microscopy gives you the unique opportunity to have hands on access to the electron microscopes. Microscopy is a growing field of study that uses the microscope as an analytical tool, with applications in medicine, cell biology, biomaterials, nanotechnology, engineering and many other disciplines.

Make the invisible world become visible in this lab-based course, open to all Academies and grade levels. Intro to Microscopy is designed around hands on lab activities, preparing and imaging samples that can only be seen with the electron microscopes, with few take home assignments. In this course you will learn how to use this technology to answer scientific questions and sharpen your scientific writing skills. This course is also a pre-requisite to the independent research program of the Nano-Structural Imaging Lab with Mrs. Waldron.

This goal of this course is a practical application of the scientific method; using primary literature to design an experiment, carrying out the experiment, collecting and analyzing data, drawing conclusions and communicating your findings.

#### **Course Outline:**

- Basics of Microscopy (what are the tools and what do they do?)
- Scientific Writing Skills
- Introduction to Research Project – Reading Scientific Literature
- Proper Data Handling & Adobe® Photoshop®

- Scanning Electron Microscopy – Sample Preparation and Imaging
- X-ray spectroscopy
- Introduction to Viruses
- Transmission Electron Microscopy – Sample Preparation and Imaging

### ***Nano Research Lab [Mrs. Waldron] - 9 10 11 12 (Elective) Year Long***

For research in the Nano-Structural Imaging Lab, student can be ANY grade level and enrolled in ANY Academy.

**Prerequisite Course:** Introduction to Microscopy elective

**Beginning Research:** After successful completion of the prerequisite elective, students will have the opportunity to design and carry out an independent research project that reflects their interest in cell/molecular/structural biology. Students are required to sign up for a minimum of 6 mods (2 hours) per week for research, however, more than 6 mods per week may be necessary in a given week to complete all research work.

Students will begin their research by developing a project. This will require students to spend their time in the lab discussing interests with mentors, looking at examples of projects currently going on in BCA Research, and consulting the primary literature. Primary literature will be the main source of information for students regarding the current state of research in their desired field. A written research proposal or abstract is expected from students by the end of the first trimester. In addition, a list of chemicals or supplies not in stock in the labs will be required. After successfully developing a research proposal, students will begin training with instruments such as the electron microscopes, or will begin learning necessary techniques, such as sterile technique for cell culture.

After a training period, students will be expected to independently maintain cells, perform appropriate assays and collect data. Depending on the state of the project and grade level, students will be expected to participate in one or more of the following: North Jersey Regional Science Fair, Young Science Achievers Program, Intel ISEF, Regeneron STS, Siemens competition, Google Science Fair, Bio GENEious, among others, including publication in Microscopy & Microanalysis or any other appropriate journal.

# **BUSINESS**

## ***Management and Marketing – 9 (ABF Core) Full Year***

This course explores the nature and scope of business and examines its component parts. The course will discuss the different forms of business ownership, including sole proprietorships, partnerships and corporations to describe how business is organized and managed. The course will provide an integrated and balanced coverage of the internal and external forces that comprise our business and economic system the legal environment. Students will learn the importance of ethical decision-making and the effects decisions have on organizations, consumers and employees. The course introduces the topics related to supply chain management connecting ideas to the real world.

This curriculum includes an in depth exploration of management and marketing topics. The focus will be on the management process presented under the functions of planning, organizing, directing, and controlling. We will also cover operations and human resources management. The second half of the year is a study of the marketing mix including product, pricing, promotion, and distribution. Teaching methodologies include small group and class discussions, application of content to our own lives or real world scenarios, collaborative projects and case studies. Topics may include: Business Management, Organizing the Business, Operations Management and Quality, Employee Behavior and Motivation, Leadership and Decision Making, Human Resource Management and Labor Relations, Marketing Processes and Consumer Behavior, Pricing Distributing and Promoting Products.

Text book: Business essentials; Ebert and Griffin, Business Essentials, Ninth Edition, Pearson

## ***Advanced Business Topics II – 10 (Core) Full Year***

This course will focus on financial management topics for individuals, financial institutions and corporations. This is a full-year course held twice a week. Course content includes an in-depth understanding of financial accounting concepts and financial statement preparation and analysis, an

understanding of US and international financial markets (interest rates, bond and stock markets), the structure and functioning of the US Central Bank and related financial institutions and corporate financial management topics. The course will include lecture, power-point presentations, handouts, classroom discussion, use of Bloomberg data and analytics software and a variety of on-line analytic tools and data sources. Students will be expected to keep a daily journal of key economic data, economic, political and current events and developments in the financial markets. There will be significant classroom discussion dealing with current world events and their financial consequences. Students will be using Excel spreadsheets and calculators and applying quantitative methods to support business decisions.

The course content includes the following topics: Financial Accounting: Recording financial transactions; balance sheet and income statement accounts; compiling financial statements; Financial Statement analysis; ratio and trend analysis; determining a company's financial condition using publicly issued 10-K financial statements; US Financial Institutions: Commercial Banks, the Federal Reserve System, the role of Investment Banks; US Financial Instruments: Time Value of Money concepts, Interest rates, Fixed income markets, Equity markets, Options markets; and Regular discussion of the economy and financial markets conditions in the context of current news events.

The students will learn about financial accounting and its importance as a fundamental business tool and answer questions like how do financial statements tell the story of a company's financial condition. What are financial markets and what is their role in allocating capital and ensuring the proper functioning of the global economy. The working of Bond and stock markets and role of financial institutions will be analyzed with an emphasis on decision making role of a corporate financial manager.

Textbook: Ebert and Griffin, Business Essentials, Ninth Edition, Pearson; Chapters 14- 16.

### ***Business Applications – 10 (Core) Full Year***

Business Applications is a full-year sophomore course held twice a week. Students begin the course by developing an understanding of the many roles of technology in a business. Next, students perform IF Then analysis in Excel to make business decisions. The next part of the course is centered

on a database project in which students will design and create their own database in Microsoft Access. Finally, students will use business simulations to utilize the knowledge that they have learned in all of their freshmen and sophomore year business courses and test their decision making skills in an interactive environment.

### ***IB Economics HL (Microeconomics) - 11 (Core) Full Year***

The IB Diploma Program economics course emphasizes the economic theories of

Microeconomics. The introductory unit is designed to connect students to the Key, overarching, economic concepts that appear throughout the course and focus on the idea of scarce resources and unlimited wants. The microeconomic concepts deal with economic variables affecting individuals, firms and markets. Students analyze the fundamentals of demand and supply, examining the theory of the firm, and the behavior of profit-maximizing firms under various market structures. They will evaluate the efficiency of the outcomes with respect to price, output, consumer surplus, and producer surplus. Student will have an opportunity to examine the behaviors of households and businesses and consider instances in which private markets may fail to allocate resources efficiently and examine various public policy alternatives aimed at improving the efficiency of private markets. The course studies how monopolies, oligopolies, and competitive firms behave and how they determine their level of output. Students analyze the government's role in promoting greater efficiency and equity within the economy.

### ***IB Economics HL (Macroeconomics) - 12 (Core) Full Year***

In this class students will gain an understanding of the macroeconomic principles that drive the global economy; also, they will gain an appreciation for the economic developments and policy tradeoffs that dominate our news headlines and political discourse. In this course, students will learn to analyze and measure the state of the economy and understand the determinants of economic growth; the tradeoffs between inflation and unemployment, demand-driven and supply-side macroeconomic theories, fiscal and monetary policy; international trade and economic development. We will spend time in class discussing and

analyzing current world news and economic developments in order to apply economic theories to real-world situations. We will follow the HL Economics course syllabus (revised for exams starting in 2013) as mandated by the IBO. The topics covered will be Section 2:

Macroeconomics; Section 3: International Economics; Section 4: Development Economics:

**Textbook:** Tragakes, Economics for the IB Diploma, 2nd edition, Cambridge University Press, 2012

### *AP Microeconomics - 11 12 (Elective) Full Year*

Students in AP Microeconomics will study the individual players in a market economy. Throughout this course, students will examine how consumers, firms and the government make economic decisions, and the resulting effects these decisions have on the remaining sectors. Students will have the opportunity to practice economic thinking, and consider the decisions made in both the product and factor markets. Students will be expected to understand economic theories and models in each unit, and apply these models to various economic case studies. This course will prepare students for the AP Microeconomics Exam. The AP Microeconomics Exam, developed and scored by the College Board, is comprised of two sections, including multiple choice questions and free response questions (FRQs). This course is structured as a college course. Students will be expected to keep up with all of your work and course readings. Success in this course stems from students' ability to maintain a strong work ethic, actively participate in class, and practice the concepts introduced.

### *AP Macroeconomics - 12 (Elective) Full Year*

AP Macroeconomics is a course designed to provide students with a thorough understanding of the principles of economics in examining aggregate economic behavior. Students taking the course can expect to learn how the measures of economic performance, such as GDP, inflation and unemployment, are constructed and how to apply them to evaluate the macroeconomic conditions of an economy. Students will also learn the basic analytical tools of macroeconomics, primarily the aggregate demand and aggregate supply model and its application in the analysis and

determination of national income, as well as evaluating the effectiveness of fiscal policy and monetary policy in promoting economic growth and stability. Recognizing the global nature of economics, students will also have ample opportunities to examine the impact of international trade and international finance on national economies. Various economic schools of thought are introduced as solutions to economic problems are considered. (Prerequisite: AP Microeconomics) The course outlines the working of the Federal Reserve System and the tools of monetary and fiscal policy. The final section of the course deals with international economics, where the students learn about the effect of world trade, capital flows and determination of foreign exchange rates.

### ***Introduction to Business Management I/II - 11/12 ACAHA (Core) Full Year***

This course is a two-year sequence designed to follow the IB Business Management (SL) curriculum. The purpose of this course is to develop an understanding of business theory and principles and to apply these theories and principles to a variety of practical business situations. It is offered as a core requirement for ACAHA juniors and seniors. It is designed to introduce and explore aspects of business management that are of vital importance for students who seek to pursue advanced study and careers in hospitality management, business or entrepreneurship.

The course covers the following curriculum: Business Organization and Environment, Human Resource Management, Finance and Accounts, Marketing, and Operations Management. The course will include lecture, case studies, presentations, classroom discussion, and a variety of data resources. Students will be expected to be aware of key economic, political and current events. There will be significant classroom discussion dealing with current business conditions and world events and their consequences for business decision-making.

**Textbook:** Stimpson, Peter, and Alex Smith. *Business Management for the IB Diploma*. Cambridge: Cambridge UP, 2015.

### ***Financial Literacy - (Required)***

This course will prepare students for the challenges of planning for their

financial futures. A better understanding of personal finance will help students to make informed financial decisions for themselves as well as strengthen the economy at large. Topics may include banking, earnings, saving, spending, budgeting, credit card use, taxes, debt, and insurance. Students will have the opportunity to engage with these topical areas by progressing through interactive learning modules.

## **CHEMISTRY**

### ***Introductory Chemistry - 9 (H) AAST/AEDT (Core) Full Year***

This is the first course in the basic three year chemistry sequence which is part of the AAST/AEDT curriculum. Students gain a fundamental understanding of atoms, molecular structure and bonding, chemical reactions, the periodic table, stoichiometry, solutions, and pH. The course ends with a brief introduction to organic chemistry. Laboratory work is an important part of this course and laboratory reports are required.

### ***Introduction to Chemical Engineering and Processes - 10 (H) AAST (Core) Full Year***

This rotation course introduces second-year AAST students to many of the theoretical and practical considerations involved in small and large-scale chemical processes. Typical rotation modules include modeling plant-scale efficiency, chemical separation/purification and chemical analysis of condensed and gaseous phases.

### ***Intermediate Chemistry - 10 (H) AAST/AEDT (Core) Full Year***

The second course in the basic three year chemistry sequence which is part of the AAST/AEDT curriculum. The course covers gas laws, thermochemistry, atomic structure, and periodicity. A substantial part of the course involves chemical equilibrium. Laboratory work is part of the course and lab reports are required.

### ***Physical and Organic Chemistry - 11(H) AAST/AEDT Core Full Year***

Following Introductory and Intermediate Chemistry, this is the final course of the three-year AAST/AEDT chemistry curriculum. The essential topics covered include thermodynamics, kinetics, inter-particle forces along with organic chemistry reactivity and analysis. Connections and practical applications, including laboratory work, within various chemical and engineering fields are incorporated throughout the curriculum.

### ***Introductory Chemistry - 9 (H) AMST (Core) Full Year.***

This is the first course in the two year chemistry sequence which is part of the AMST curriculum. Students gain a fundamental understanding of atoms, molecular structure and bonding, chemical reactions, the periodic table, stoichiometry, and solutions.

### ***Advanced Chemistry - 10 (H) AMST (Core) Full Year***

The second course in the two-year sequence taken by AMST students extends the first course (210M) by covering the following topics: gas laws, thermochemistry, atomic structure, periodicity, chemical equilibrium, colligative properties, states of matter, thermodynamics, rates of reactions, electrochemistry, and an introduction to organic chemistry. Laboratory is an important part of this course.

### ***Topics in Science and Research - 9 (H) AAST (Core) Full Year***

This is a rotation course that exposes first-year AAST students to the facilities and opportunities for independent research within the Biology, Chemistry and Physics departments. Possible rotation opportunities include chemistry & nanotechnology, microscopy, optics among other STEM (Science Technology Engineering and Math) areas.

### ***Chemistry - 10 (H) ABF (Core) Full Year***

This is the core chemistry course taken by ABFIB students. Topics covered include atomic structure, molecular structure and bonding, chemical names and formulas, chemical reactions, the periodic table, stoichiometry, solutions, acids and bases, states of matter, gas laws, thermochemistry,

solutions, and an introduction to equilibrium. Laboratory is an important part of this course.

### ***AP Chemistry - 11 12 (Elective) Full Year***

This full year elective is a systematic review of previous chemistry courses with the addition of some new material. It should be of interest to students who want to improve their preparation for college chemistry as well as to those who plan sit for the College Board Advanced Placement examination. Topics covered include gas laws and stoichiometry, equilibrium, acid base chemistry, atomic theory, structure and bonding, thermodynamics, chemical reactions states of matter, colligative properties, kinetics, and electrochemistry. A small amount of organic chemistry is also covered. The class meets three times per week. Labs are an important part of the course. AP Chemistry focuses on developing analytical and problem solving skills. Therefore, students are expected to complete one hour of homework and/or studying on their own per hour of class time. The AP Chemistry curriculum for the AAST and AEDT academies includes six lengthy problem sets and three unit tests in a typical trimester as the major forms of assessment. The AP Chemistry curriculum for all other academy students includes weekly quizzes along with three or four unit tests in a typical trimester.

### ***Chemistry and Nanotechnology Research - 11 12 (Elective) Full Year***

Under the supervision of a faculty member, students carry out original projects in chemistry. The completed project should be suitable for a poster or verbal presentation and/or for publication. Projects are generally suggested by a faculty member; however student-originated projects are welcome. This course involves a substantial time commitment on the part of both the student and the faculty member. Enrollment is, therefore, limited.

### ***Physics/Chemistry Lab - 9 (Core) Full Year***

The goal of this four mods/week course is to provide students with a hands on laboratory experience. Students perform basic experiments in various areas of chemistry and mechanics as they collect and analyze data.

Several labs are based on computer simulations of various physics effects.

## **CULINARY**

### ***Introduction to Hospitality and Culinary Arts - 9 (Core) Full Year***

In this course, students will get an overview of the many dimensions of the hospitality industry. The food, beverage and lodging segments of this industry will be explored as well as the historical foundations and the many career possibilities of the hospitality industry. Students will also receive exposure to the fundamentals of the Culinary Arts including safety, sanitation, knife skills, soup and sauce preparation, etc.

### ***Hotel Management & Culinary Theory - 10 (Core) Full Year***

This course is designed to build on previous fundamental skills & knowledge developed in Introductory 9<sup>th</sup> grade course. This course will enhance the field of study of the two principal segments of the hospitality industry; food & beverage and lodging. The students will also build on their culinary theory principles to start to apply them to mastery. Hotel Management & Culinary Theory also focuses on the development of flexible skills, which are essential for success in a Hospitality career.

### ***Entrepreneurship/Advanced Culinary/Pastry Arts - 11 (Core) Full Year***

The basics of an operational theory of hospitality management are presented under the functions of planning, organizing, staffing, and controlling. This course is administered throughout the year in conjunction with the National Restaurant Educational Foundation's ProStart Management Curriculum. This course will enhance the field of study of the principal segments of the hospitality industry including introduction of entrepreneurship and management. The students will be building upon their knowledge and skills and beginning the mastery of culinary practices and baking procedures.

### ***Hospitality Management/Advanced Culinary/Pastry Arts/ServSafe -***

## ***12 (Core) Full Year***

The course content will continue with ProStart – Level Two – The Foundations of Management in conjunction with the National Restaurant Educational Foundation. A final national certification test will be administered. The highlights of the year’s course work will be the Chocolate Competition, Holiday Gingerbread Houses, Entrepreneurial project, Marketing and Media Project and management experience running the Academy Grill. The students will be enhancing their advanced skills in management principles, culinary practices and baking procedures in the above mentioned course work.

## ***History of the Cocoa Bean - 11 (Project) Two Trimesters***

This is a two trimester mandatory project for all ACAHA junior students. Students will understand and research the relationship between the history, economic, geographical, and processes of the Global Chocolate making industry. Students will develop skills and design techniques to produce an edible showpiece at the culmination of the Chocolate Competition. Students will understand the design process to take a creative concept from idea to production. Students will partner with an engineering student for additional construction concepts and principles.

## **ENGLISH**

### ***American Literature I - 9 (H) (Core) Full Year***

American Literature I Honors consists of a genre-based study that explores American literary history. We encounter issues of gender, class oppression, and alienation as we explore connections of society’s beliefs and the literature it produces. Through the literary genres of novels, plays, essays, short stories, personal narratives, and poetry, we will learn techniques of critical analysis and interpretation and apply them in classroom discussions, oral presentations, papers, and multimedia projects. The exploration in the course will enable students to appreciate the artistic as well as historical value of literature and develop the necessary skills to engage with it on a personal and intellectual level.

These texts and their use will develop students' listening, speaking, reading, thinking, and writing skills, as well as their vocabulary knowledge. A crucial component of this course is to develop and build upon the students' skills to become satisfactory and confident writers and speakers.

### *American Literature II - 10 (H) (Core) Full Year*

In this 10th grade core honors course, students explore the various aspects of American life and culture through representative readings/assignments designed to develop the student's listening, reading, writing, viewing and speaking skills. In addition to literary studies, students receive instruction and practice in all phases of the writing process, from draft to finished, formal essay. Multimedia resources and collaborative learning will be featured, as will vocabulary building activities that will aid in the development of effective writing/communication skills. Students will be expected to: become confident, critical readers/interpreters of literature; develop proficiency in creating questions about the material and answering these questions through writing/class discussion; engage in thought-provoking, intelligent discussions with the instructor and each other about the work and how it relates to their own experiences; and to compare the various authors' treatment of major themes.

### *World Literature I - 11 (H) (Core) Full Year*

This 11th grade core honors course constitutes the first part of a two-year survey of world masterpieces. World Literature I Honors is designed to give students an understanding of central literary works beginning with the ancients (Mesopotamia/Greece,) through the Middle Ages and the Renaissance. (Students will be exposed to selections of literature across time and from around the globe.) The social, economic, cultural, historical, and political forces that contributed to the creation of these texts will be considered, and the purpose/effective use of literary critical theory will be introduced. By emphasizing critical thinking, close reading, effective writing, articulate speaking, and active listening, students will develop the analytical skills needed to achieve in academic environments and move towards the development of a personal style which articulates with intelligence, precision, and creativity.

## ***World Literature II - 12 (H) (Core) Full Year***

This 12th grade core honors course is an extension of World Literature I Honors and focuses on literature from the 16th through the 21st centuries. Although great works of literature anchor the course, the economic, political, social, and cultural influences upon these works will also be considered, as will the function of literary criticism in terms of approach: historical, biographical, psychological, reader-response, formalist, etc. Through various literary genres (novel, play, essay, short fiction, poetry) techniques of critical analysis and interpretation will be introduced and applied in classroom discussions, oral presentations, personal essays, analytical essays, in-depth literary analyses, and multimedia projects. Issues of gender, class oppression, and alienation will be encountered as connections between a society's beliefs and the literature it produces are explored. World Literature II Honors moves from the Renaissance to Modernism and explores various themes, including the dual nature of man, good versus evil, and the archetypal theme of man's limitations in his quest for understanding.

## ***IB World Literature I, II HL - 11 & 12 (Core) Full Year***

IB World Literature I and II (English A: Literature) is a two year course designed to prepare students for successful execution of the assessments for their International Baccalaureate grade while exploring literature from a broad perspective. It constitutes a two year survey of various literary genres, many written in English and some in translation. IB Literature calls for close readings of printed texts. Through an interdisciplinary, hands on approach, students pursue knowledge both as an independent agent and as a member of a cooperative group. As defined by state guidelines, the course advances each of the "strands" of English (reading, writing, speaking, and listening) toward the development of a personal style articulated with intelligence, precision, and creativity. Students will continue to develop their nascent skills in writing and thinking critically, listening and speaking effectively, researching and evaluating the validity of materials, and comprehending and analyzing literature.

## ***IB Language and Literature I, II HL - 11 & 12 (Core) Full Year***

IB Language and Literature (English A: Language and Literature) is a two-year course aimed at developing students' critical reading skills of both literary and non-literary texts while preparing them for successful execution of the assessments for their International Baccalaureate grade. For the purpose of the course, a "text" is defined as anything from which information can be extracted and includes the widest range of oral, written and visual materials present in society. Thus, students can expect to read more traditional literary texts as well as to find and analyze a broad range of print and non-print texts. Central to the course is the notion that the reader of a text is as much a producer as a consumer of meaning. IB Language and Literature students will explore the way that the meaning of a text is affected by such things as the text's language, historical context, and the reader's cultural background. Students will practice both formal literary analysis skills usually associated with traditional literary studies as well as "media literacy" skills that focus on the deconstruction of non-literary texts such as news reports, film, music, visual images, pop art, and online content.

## **FINE AND VISUAL ARTS**

### *Introduction to Visual Art - 9 (Core) Full Year*

Students are introduced to the fundamentals of digital drawing and painting using Adobe Photoshop and Illustrator. They learn the basic tools and functions of the applications and are encouraged to create, design and explore a wide variety of media and processes to create images. Course content and projects include computer instruction in, and production of, 2-D graphic and package design. Students utilize scanned and digitally designed images, as well as their newly acquired understanding of color output as tools for transforming two-dimensional surface design into three-dimensional displays. Students also look into the foundation of web publishing skills using Adobe Dreamweaver. Web skills developed include creating a page with images, including animated gifs and multiple rollover images, hyperlinks, and uploading a website using file transfer protocol. Basic CSS concepts are also covered. This course is taught in a format where students can share ideas openly with each other, as well as

the teacher, in order to promote and develop critical thinking skills they can continue to develop throughout their time at BCA.

### ***Foundations of Visual Art - 9 (Core) Full Year***

This course serves as the introductory foundation course for Visual Art majors. Modeled after the conventional and highly successful post-secondary level foundation course found in most art schools, this course imparts the necessary skills for development as a competent and objective visual artist. A major focus of this course is the concentration on the Elements and Principles of Art/Design and on bringing student drawing and design skills to a more mature level. Aside from the studio activities and specific design and intensive drawing skills taught in this course, students are required to maintain a sketchbook and a portfolio. Students are also introduced to the areas of aesthetics and critique enabling them to develop cognitive skills and a working vocabulary allowing them to analyze their art and the art of others.

### ***Design & Production I - 10 (Core) Full Year***

The objective of this course is to enable students to become familiar with the basic terms, materials, and techniques employed by visual artists, as well as to develop a foundation of the elements and principles of art and design. Topics covered mirror those covered in post-secondary institutions and are designed to prepare the student for success at that level and beyond. The course begins with color theory; students learn how color is used effectively in various scenarios and develop a project based on different color concepts. Web development including some of the latest technologies is covered, including HTML5, CSS, JavaScript, and JQuery. In addition to JavaScript for the web, graphics programming using Processing is explored as a bridge to interactive design and game development. Students will also become proficient with the Adobe creative suite in preparation for certification in the popular Adobe applications. Throughout the course, students are required to demonstrate left/right brain function as it relates to artistic development. Students are expected to use their skills to create works that express a personalized view using the suggested/required methods and materials. The class meets twice a week and runs concurrently with Design & Production II.

## *Design & Production II - 10 (Core) Full Year*

This is one half of the sophomore-level, full year Visual Academy core class. Students will develop skills in a variety of different areas through the following project-based units:

### **1) Producing a video for CSPAN's Studentcam Competition**

This task will require that students learn the entire video production process; this includes pre-production, production, and post-production. The pre-production phase will introduce students to the development of a topic, creating a treatment, researching their topic, identifying possible interview subjects, writing appropriate questions for these interviews, finding copyright free materials (photos, videos, music) for their videos, and writing the necessary voiceover and stand-up materials. Production will take them through the actual recording of their video so they will learn about proper (and safe) usage of a video camera, basic video composition procedures and terminology, and proper interview techniques. They will ultimately shoot all of the necessary interview and B-roll footage for their videos. Finally, they will learn the post-production phase which is where they will take all of their assets and edit them into a completed production. During this phase, they will learn to use our current non-linear editing package to trim clips, change the order of video segments within an editing timeline, adjust audio levels, overlay both audio and video, add transitions, add lower thirds and graphics, and add a credit roll. They will finish this project by exporting a version that can be uploaded to the CSPAN web site by the deadline during the third week in January. Students will work in teams of two to produce these videos.

### **2) Shooting interviews for "The Romance Chronicles"**

This unit allows students to put the video production knowledge they acquired in the CSPAN project to more creative use while at the same time helping to support one of the most popular video projects of the entire school year. Students will work in teams of four to five to accomplish this task.

### **3) Virtual Animals**

Students will be introduced to Virtual Reality (VR) through their creation of a virtual animal using the Oculus Rift VR headset along with the VR sculpting package "Medium". Students will pick an animal and then find reference photos of their animals on the Internet. They will then use these

pictures to create sketches of their animals. Students will then use Medium to create their animals based on parameters that will force them to model the animals as if they were using a 3D computer program, such as Maya. Students will be given instruction in the use of Medium to create and manipulate their animals. Students will also be provided guidelines to ensure that these animals will be able to stand upright on their own. This is particularly important as the second part of this project will involve 3D printing the student creations using the district's 3D printers.

#### **4) Historic Shadowboxes**

In this project, students will create shadow boxes based on historical landmarks from towns in Bergen County. Students will research possible sites and propose a final choice based on the information and pictures they are able to secure. Pictures may be found on the Internet but students are encouraged to take their own pictures in order to capture the exact angle and lighting they want to use. During the course of this project, students will use advanced Photoshop techniques to create their final image for etching. They will then use advanced Illustrator techniques to create the cutting paths for their shadowbox layers. They will then receive instruction on the safe and proper use of the district's laser cutter before cutting their shadowbox layers. After this, they will learn basic woodworking skills in order to cut the wood and assemble the frames for their shadowboxes. The final phase of this project will involve painting a watercolor background for their shadowbox and then adhering this image to the back layer of their shadowbox.

#### **5) "End of Spring Visual Academy Fling" Gallery Production**

Students will help to design and assemble the gallery that is created to display their work during the last week of school.

### ***Emerging Technologies I - 11 (Core) Full Year***

Multimedia is a theme used in many of the projects developed throughout this course. Advanced topics in web development will be examined, including animation, UX, UI patterns, responsive design, and a more in-depth look at CSS, JavaScript, and JQuery. Students will incorporate these concepts in web applications they develop. Students will be introduced to real-world situations and the applications used to create works that are aesthetic, practical and feasible for interaction or display, on screen or for print. Students will also learn the proper way to develop and prepare

designs that they will cut and/or engrave on a laser cutting system. As with all of the visual arts courses, the topics covered mirror those covered in post-secondary institutions and are designed to prepare the student for success at that level and beyond. The class meets twice a week and runs concurrently with Emerging Technologies II.

### *Emerging Technologies II - 11 (Core) Full Year*

This is one half of the junior-level, full year Visual Academy core class. Students will develop skills in a variety of different areas through the following project-based units:

#### **1) 3D Printing**

This unit will introduce students to the basics of 3D printing. Using the Virtual Animals that were produced as sophomores, students will learn how to bring their exported models into a 3D printing package, and how to scale, rotate and transform them. They will also learn about the various parameters that can affect the time it takes to print a model, the strength of the finished model, and the material costs associated with certain settings.

#### **2) Creating Virtual Environments with Unity**

In this unit, students will work with a variety of Virtual Reality (VR) tools to create objects and scenes that will then be imported into the game development software, Unity. The VR software they will use includes both Tiltbrush and Blocks. Once they have designed their objects in these programs, they will learn the basics of working with Unity, particularly to create virtual reality experiences. Within Unity, they will learn about scene creation, object creation and modification, creating physics, adding lighting, and maximizing the efficiency of their worlds so that users get a smooth, lag-free immersive experience.

#### **3) Movie Poster Trailer Production**

Working from the movie posters they made as sophomores, students will create a short trailer for their movie. This unit will allow them to review the video production principles they learned during sophomore year while applying these skills in a fun and creative manner.

#### **4) Shooting interviews for "The Romance Chronicles"**

This unit allows students to put the video production knowledge they acquired in sophomore year to more creative use while at the same time helping to support one of the most popular video projects of the entire school year. Students will work in teams of four to five to accomplish this

task.

### **5) Technology Zoo**

In this project, students will create an animal sculpture using recycled technology elements. Students will disassemble equipment that no longer functions (either brought in from home or old district equipment that has been taken out of service) and use these components to create their animal. Students will learn to use basic hand tools for the disassembly of the recycled equipment. These include: screwdrivers (slotted and Phillips head), wrench, pliers, cutters, tin snips, and wire strippers. Students will pick an animal, find reference photos of this animal on the Internet, and then sketch a design for their animals after surveying the materials available to them. Students will then assemble the animal using a variety of tools and techniques. In addition to the basic tools mentioned above, these include epoxy, glue guns, and basic soldering. The completed animal must fit within a 1 foot cube and be capable of standing on its own with no other support. A number of documents, including a final set of presentation slides, will be produced throughout the project to document project progress.

### **6) "End of Spring Visual Academy Fling" Gallery Production**

Students will help to design and assemble the gallery that is created to display their work during the last week of school.

## ***Graphic Communication I - 9 (Core) Full Year***

Introduces students to Graphic Communications. Studies includes a brief historical overview beginning with the development of movable type. Students will develop skills using pen and ink and they will be able to identify line art. Graphic arts vocabulary and the identification of popular printing substrates will be stressed throughout the course. They will explore offset lithography technology and produce a project using this method of printing. In addition, students will learn safe operation of various binding equipment as needed to complete their group projects. Other projects include, but not limited to, the use of computer graphic and page layout applications using Adobe InDesign, PhotoShop and Illustrator stressing the proper use of typography.

## ***Graphic Communication II - 10 (Core) Full Year***

In this course students will explore all facets of the graphic arts. Safety will be stressed in all hands-on activities and equipment that will be operated. Students will produce 5 sample bound books. These include case bound, perfect bound, mechanical bound, side and saddle stitch books. Students will study the chemistry of ink by creating ink samples as well as mixing ink colors to industry standards using the Pantone Matching System. Other projects include paper making from recycled materials and creating images. Intaglio and Relief printing will be two of the printing systems explored.

### *AP Art History - 11-12 Full Year*

The AP® Art History course offers students the opportunity to explore, in depth, the history of art from ancient times to the present. The course also prepares students for the AP Art History Exam. Through readings, research, DVDs, and museum visits, students will visualize significant artworks from around the world. Writing skills will be important in the description, analysis, and comparison of these works. Students are required to keep a notebook to record class discussion on significant historical events, art periods/styles, specific artworks, and issues/themes that connect these artworks. For the most part, a chronological approach is used, with occasional references to art from different periods for comparison and contrast, as well as introducing and reinforcing ties between different eras and cultures. As an integral part of the course, images from each chapter in the text are projected for viewing, with a discussion of what is being presented. Students are expected to have pre-read the chapter, and based on prompts, be prepared to give educated feedback. Discussions include formal analysis, historical perspective, contextual analysis, and symbolic/iconographic meaning. Topics for discussion in class are included in (but not limited to what is in) the course outline below. Slide-based tests will be given that cover each unit (some units are combined on assessments), including multiple-choice questions on key images or contextual issues from the text, identification of architectural features, comparisons and contrasts, and one or two short essay questions with either a ten or thirty minute duration. The essays will require students to incorporate artworks from different periods and/or cultures, including the non-European world. Themes and topics include both context and visual analysis. There will also be a mid-term test

approximately halfway through the year following the same format.

### ***Digital Photography - 9-12 One Trimester***

This Photography course is designed to teach the student how to use a camera and Adobe PhotoShop to capture, edit, manipulate and produce quality images for both print and the Internet/Multimedia. It is assumed that the student has little or no knowledge of photography. The course will help the student to become competent with a camera, both technically and composition-wise. Exercises use the cameras and image editing software to practice what was learned in theory and try different approaches to various problems. The emphasis is on digital image capture and manipulation only; there is no darkroom film processing.

### ***Visual Art Capstone - 12 (Core) Full Year***

Students work in an environment that simulates the rigors of a graphic arts facility to acquire advanced skills in this area. Students focus on portfolio development and studio projects using traditional media, as well as Adobe Suite software. Course content includes portfolio assessment, interview techniques, and presentation skills.

### ***Pre AP Studio Art - 10 11 (elective) Full Year***

This course is designed for the student considering AP Studio Art for the following year. It is a place of media exploration, i.e. charcoal, watercolor, color pencil, mixed media, and an opportunity to develop skill and technique in each. Students can bank works for their AP Studio Art portfolio from this class. It is also a testing ground for non-visual majors to validate eligibility for the extreme rigor and skill set required for AP Studio Art.

### ***AP Studio Art - 11 12 (elective) Full Year***

Designed for students who are seriously interested in developing and participating in the practical experience of serious art making and/or continuing a career in the arts. This class requires significantly more time

than regular studio classes and requires students to work outside the classroom as well as in it, beginning the preceding summer. For the purpose of achieving advanced standing at most colleges, the principal focus of the course content, based on the College Board requirements, is the preparation of the portfolio. Students focus on a sense of quality in their work, a concentration on a particular visual interest or problem, and a need for the breadth of experience in the formal, technical and expressive means of the artist. Highly recommended for Junior year, students are required to attend an info session in the Spring of Sophomore year for details and contract. Also available to non-visual majors with the permission of the instructor.

## **COUNSELING/GUIDANCE**

### ***Freshman Exploration for Social, Emotional, and Academic Success - 9 (Required) One Trimester***

As part of the developmental school guidance and counseling program, all freshmen will participate in a one trimester seminar to assist in transitioning to the Academies. This course enables students to become comfortable with their school counselor as well as peers while also exploring typical adolescent issues. By providing freshmen with the necessary academic, social and emotional skills for personal growth and development, students begin to understand their role in creating a positive school climate and making informed choices.

### ***Sophomore Seminar - 10 (Required) One Trimester***

Sophomore Seminar is designed to address important issues related to academic, career and college planning. Students will initially complete self-evaluation instruments and be introduced to valuable resources designed to help them explore and investigate the variety of options available to them. Counselors will fully discuss AP/IB course selection, meaningful enrichment/summer programs and activities, standardized tests, and methods of finding colleges that will be a "good fit." This seminar is designed to reduce the stress and anxiety students often encounter as they move forward towards their postsecondary goals.

### ***Study Skills - 9 10 (Required) Year Long***

Study Skills is a weekly opportunity for Freshmen and Sophomores to focus on their academic work for six or three mods respectively. Students can use this time to work on homework, projects, and reading assignments while being supervised by a faculty member. It is particularly beneficial for underclassmen who have traditionally struggled with time and workload management. Freshmen and Sophomores will also have the opportunity to use this time to complete MoneyU, a pass/fail, web-based, self-paced Financial Literacy course.

### ***Senior Experience - 12 (Core) Full Year***

Senior Experience is an off-campus structured learning experience internship program. Internship possibilities include such fields as law, broadcasting, publishing, government, university science research, and health-care. Placement is contingent upon student's area of interest. The goal of the internship is to provide students with an opportunity to experience direct hands-on learning in a professional setting under the guidance of an on-site mentor. Seniors report directly to the internship site every Wednesday during the entire academic year for the full business day. The culminating activity of the program is the Senior Exhibition at which students present their internship experience to the Academy community.

**Prerequisite:** Successful completion of Gateway Seminar.

## **HEALTH/PHYSICAL EDUCATION**

### ***Health - 9 (H) (Core) One Trimester***

This course, the format of which includes lectures, discussions and research, addresses a broad scope of current health issues. The topics covered include, but are not limited to, healthy behaviors, stress management, environmental health, sexuality and human relations, drug and substance abuse, diseases, and nutrition/weight control. Course requirements include oral presentations to allow students to hone in on

their speaking skills.

### ***Advanced Topics in Health and Wellness - 9 10 (H) (Core) One Trimester***

The 11<sup>th</sup>/12<sup>th</sup> grade Advanced Topics curriculum has been developed to educate each student to the four categories outlined by the New Jersey Department of Education: Wellness, Integrated skills (communication, decision making, goal setting, etc.), Drugs and Medicines and Human Relationships & Sexuality. This course aims to increase student knowledge about Wellness, Drugs and Medicines as well as Human Relationships & Sexuality through the use of integrated skills which will provide the student with the essential steps towards taking the responsibility for one's own health, relationships and lifestyle choices.

### ***Health/Driver Education Theory - 10 (H) (Core) One Trimester***

This course provides students with the foundation for becoming a responsible driver with positive decision-making skills. The curriculum focuses on defensive driving and understanding rules and regulations on the road. Emphasis is placed on state law, safe driving attitude, and drug and alcohol avoidance. Through investigation, practice of discrete skills and performances, students develop skills enabling them to administer Adult and Pediatric CPR/AED.

**Resources:** New Jersey Driver Manual ([www.njdmv.gov](http://www.njdmv.gov))

### ***Health/First Aid - 11 12 (H) (Core) One Trimester***

The intent of this course is to provide the students with the knowledge and skills necessary to recognize and handle a medical emergency. Upon completion of this course the student will be able to identify ways to prevent injury or illness, recognize when an emergency has occurred, follow three emergency action steps in any emergency, provide basic care for injury or sudden illness until the victim can receive emergency medical help. Moreover, the student, as a lay responder will feel more confident in his ability to act appropriately in the event of an emergency.

### ***Health/Family Living - 11 12 (H) (Core) One Trimester***

This course is designed to explore the following topics – interpersonal relationships, foundations of human growth and development, responsible personal behavior, and family living. Students discuss, examine, and formulate their own conclusions and values concerning these topics. Aside from lectures and discussions, students will be involved in research and projects. The main project for the trimester involves students caring for a computerized baby in order to grasp the concept of being a parent.

### ***Physical Education - 9 10 11 12 (Core) Two Trimesters***

The physical education course at the Academy is designed to contribute to the well-being of the student physically, intellectually, emotionally, psychologically and socially. Emphasis is placed on personal fitness and the pursuit of lifetime activities. Education on the physiology of exercise is integrated into the course so that students have a better understanding of the relationship between exercise and their well-being. A scientific approach to human physiology is emphasized.

## **HISTORY**

### ***US History I Early American Studies - 9 (H) (Core) Full Year***

During their freshman year the students will take the course Early American Studies (Pre IB). This course will serve to prepare students for studies in the International Baccalaureate Higher Level program. This course will strive to provide students with a broad and thorough understanding of American History. The students will develop a history oriented vocabulary, a solid knowledge of geography, a basic understanding of political/economic systems, as well as the basic facts of American history and a strong sense of chronology. Students will attain the necessary skills to become successful students of history. They will become historical thinkers that can examine different points of view,

handle and interpret documents, learn basic research techniques and note taking skills. The students will be able to formulate a thesis and construct an essay, as well as acquire presentation skills and the ability to convey their ideas.

### ***World History I - 9 (H) (Core) Full Year***

The ninth grade history class at the Academy is titled World History – The Emerging Modern World. This course will serve to prepare students for studies in the International Baccalaureate Higher Level program. This course will strive to provide students with a broad and thorough understanding of Global History from the Medieval Era through the Industrial Revolution. The students will develop a history-oriented vocabulary, a solid knowledge of geography, a basic understanding of political/economic systems, as well as the basic facts of Global history and a strong sense of chronology. Students will attain the necessary skills to become successful students of history. They will become historical thinkers who can examine different points of view, handle and interpret documents, learn basic research techniques and note-taking skills. The students will be able to formulate a thesis and construct an essay, as well as acquire presentation skills and the ability to convey their ideas.

### ***World History II - 10 (H) (Core) Full Year***

The tenth grade history class at the Academies is titled World History II – Underpinnings of the Modern Era. This course will serve to prepare students for studies in the International Baccalaureate Higher Level program. The course will strive to provide students with a broad and thorough understanding of Global History, analyzing and exploring the interconnected nature of international events. The content of the curriculum will guide students through the revolutions and independence movements of the late 18th and early 19th centuries through the major movements of thought and developments that helped lay the foundations of the 20th and 21st centuries. Students will develop a strong understanding of historic events within their context utilizing diverse sources and historic perspectives, as well as establish connections of historic events to modern history. The course will allow students to develop understanding of political, social, and economic systems as

reflected in the 19th century, as well as current events. Students will attain the necessary skills to become successful students of history. They will become historical thinkers who can examine historiography, handle and interpret documents, learn higher level research techniques and note-taking skills. The students will be able to formulate a thesis and defend it under peer review.

### ***US History II - 11 (Core) Full Year***

This course is a continuation of the 9th grade United States History I course. It is a reading and writing intensive class that focuses on working closely with primary documents. Beginning with a focus on Reconstruction and continuing through the dawn of the 21st Century, students will further develop the critical thinking skills necessary to become adept at understanding the complexities of issues involved in the study of the social sciences. The students will build upon their solid knowledge of geography, understanding of political/economic systems and predominant issues of American history. They will further their research techniques and note taking skills and be able to formulate a thesis, construct an essay, and refine presentation skills to convey their ideas.

### ***The IB HL History of the Americas - 11 & 12 (Core) Full Year***

Given that the study of history from an international perspective is becoming increasingly relevant, this curriculum strives to provide students with an historical understanding within a global context. Students will gain an in depth historical knowledge that explores various cultures. They will also be able to use and communicate this knowledge in clear, coherent, relevant and well substantiated arguments. The students will become critical historical thinkers with the ability to select and effectively use acquired knowledge. The knowledge and skills gained throughout their two years will leave a lasting appreciation and interest in history regionally, as well as internationally.

This is a two year comparative course that will integrate the history of the United States, Canada, and Latin America in the 20th Century. During junior year of this course, students will explore the common experiences in

the Americas through a comparative study of economic, political, social and cultural issues. The course will select from the International Baccalaureate regional study topics for History of the Americas. During senior year, students will study Twentieth Century global topics such as the World Wars and the Cold War. Students will be assessed in a variety of ways through the completion of projects, essays, objective and subjective tests including document based questions, and in class performance. Another component of assessment will be the externally moderated IB papers (Papers 1, 2 and 3) as well as the Internal Assessment. 10!12 position papers per trimester (1 page each); Read 1!2 journal articles per week; 2!3 exams per trimester in which essays that target higher level thinking skills are emphasized; 1 comprehensive project per unit, which requires students to take responsibility for topics being studied; 1 research paper completed during junior and senior years.

### *American Political Systems - 11 12 (Elective) Full Year*

This course is designed to teach 11<sup>th</sup> and 12<sup>th</sup> grade students to compare, contrast, and critically analyze important concepts in U.S. politics through in-depth study of American government and politics. This course is a college-level course and is rigorous and demanding with significant reading in-class and for homework (an average of 10-20 pages nightly - meaning some nights may be five pages and another night it might be 25). Additionally, students will continually pay attention to current domestic and international events throughout the school year to put what we are learning into context of the present and near future. It is important to understand that students are expected to follow the news beyond the classroom and not only watch news programs, but also read news articles. This yearlong college-level course prepares students to take the AP United States Government exam if they wish, but it is not a requirement for the course.

### *Theory of Knowledge - 11 12 ABF (Core) Year Long*

Theory of Knowledge (TOK) links the traditional fields of content knowledge (history, language, science, etc.) by asking students to consider what is known and how that knowledge is obtained. To achieve this goal,

students will continually return to the fundamental question, what gives knowledge its validity? For example, students will consider/question scientific claims from a variety of perspectives. Should scientific theories be believed because they are created by experts? Can non-scientists participate in the examination of scientific knowledge? Is the scientific method universally applicable? Do all cultures use the scientific method? The above examination implies that limitations to knowledge exist. Within the scientific method, an overly restrictive hypothesis is easily supported but limited in scope, while an overreaching hypothesis is readily refuted. Such problems are present in all areas of knowledge. By understanding what gives knowledge validity and other knowledge issues, students will develop their critical thinking skills. As a result, students will be better equipped to understand all the areas of knowledge they encounter throughout their formal education and beyond.

In addition to a variety of short writing and presentation assessments done in the normal course of this class, students will complete an externally assessed essay and an in-class presentation as stipulated by the IBO requirements before finishing the course their senior year.

## **MATHEMATICS**

### ***Advanced Algebra - 9 (H) (core) Full Year***

This course deal with advanced topics in algebra and trigonometry. It provides a bridge for students making the transition from their past math preparation to the BCA math course sequence.

### ***Math Analysis I - 9 10 (H) (core) Full Year***

Analysis I includes linear and quadratic functions, polynomials, inequalities, functions, exponential and logarithmic functions, right triangle trigonometry, an introduction to analytical trigonometry, sequences and series, probability and statistics, and geometry.

### ***Advanced Math Analysis I - 9 10 (H) (core) Full Year***

Advanced Analysis I covers all of the content of Analysis I at a faster pace.

In addition, there are 1-2 units of college-level logic and almost an entire year of high-school geometry with proofs, all within the same time as Analysis I.

### ***Mathematical Structures and Proofs 9 (H) (core) Full Year - 9 (H) (core) Full Year***

Discrete Math is a course meant to challenge our top 9th grade students. Certain parts of the course will expect a level of rigor students may not be used to. The course begins by covering mathematical and symbolic logic, to introduce the concept of forming a valid argument. These skills will then be put to use in a thorough axiomatic introduction to geometry, where we will start from the very basics to build up theorems about lines, angles, circles, triangles, larger polygons, and more, including some discussion of non-Euclidean geometries where the rules we may expect do not apply. Afterwards, we switch to cover a variety of topics in algebra, building a foundation by defining functions, and learning how to work with and graph quadratic functions, polynomials, other conic sections, and the exponential and logarithm functions. Finally, we introduce some basics of number theory, such as analysis of the divisors of a number, the Euclidean algorithm, other number bases besides decimal, modular arithmetic, and some important theorems

### ***Math Analysis II - 10 11 (H) (core) Full Year***

This is a pre-calculus course that addresses a wide variety of topics. Conic sections, matrices, vectors, combinatorics and probability, trigonometry, complex numbers, and limits are all included in this course.

### ***Advanced Math Analysis II - 10 11 (H) (core) Full Year***

The course includes foundations of real analysis, analytic geometry, sequences, series, limits, functions and limits, the theory of polynomial equations, introduction to differential calculus, trigonometric functions, triangles, identities and applications, exponential and logarithmic functions, vectors, and probability.

### ***Advanced Pre-calculus 10 (H) (core) Full Year***

Discrete Mathematics II is an extension of the Discrete Mathematics I course. The course includes proofs using field axioms, set definitions and mathematical induction. Trigonometry, Demoivre's Theorem, parametric and polar graphing are also covered. Students will be introduced to basic linear algebra and the basics of calculus including limits, derivatives and applications. Probability and combinatorics are also covered. Students are introduced to the potential of mathematical research and research topics are explored.

### ***Calculus I - 11 12 (H) (core) Full Year***

This calculus course is designed to meet the needs of students who wish to continue to get a solid background and preparation for mathematics, but who do not wish to do so at the AP level. The major topics to be covered include functions, limits, differentiation, and integration.

### ***AP Calculus AB - 11 12 (H) (core) Full Year***

This course covers differential and integral calculus. An intuitive notion of the limit is introduced. Differentiation and its applications, including max/min and related rates problems are covered. The basics of integration, including the Fundamental Theorem of Calculus and the use of substitutions are discussed. Students are required to take the AP Calculus AB exam. A graphing calculator is required for both the course and the AP exam. Placement is based on the student's grade in Analysis II. About 6 quizzes and 3 tests are given during trimesters 1 and 2. During the 3rd trimester, students take a test, a graded two-day practice AP exam and the AP exam in addition to a few smaller assessments, and they complete a project. This class requires about 3-5 hours per week for homework, review of class work, study for assessments, and completion of the project.

### ***AP Calculus BC - 11 12 (H) (core) Full Year***

AP Calculus BC corresponds to the syllabus for AP Calculus BC as

determined by College Board. The course is a full-year rigorous introduction to the fundamentals of differential and integral calculus, precisely formulated definitions, and problem-solving skills in developing general mathematical concepts. The course requires an extraordinary commitment on the part of the student. The course is very fast paced and students have to always be current with the content of the course in order to avoid extreme difficulty in catching up with the rest of the class. Students will be prepared to take the BC Advanced Placement Exam in May and will be eligible for consideration to take Multivariable Calculus as the next level in the sequence of math courses. Students who have many extracurricular activities and commitments are strongly urged to carefully consider whether or not they have the time to commit to this course.

### ***Linear Algebra and Differential Equations - 12 (H) (core) Full Year***

This is a course which focuses primarily on Differential Equations, which is a natural extension of what you've covered in Calculus. In the course, students learn to solve ordinary differential equations and to use them to model real-world scenarios. In this regard, the course very closely relates to AP Physics C, which uses such techniques.

Additionally, the course provides a basic coverage of Linear Algebra. This includes the methods of working with linear equations, matrices and vectors, and proceeds until students are comfortable with calculating Eigenvalues and Eigenvectors. We will meld our knowledge of Differential Equations with our understanding of Linear Algebra to work with systems of linear and nonlinear differential equations and we will learn to model such scenarios as populations where predators interact with prey and scenarios in which diseases spread through a populace. The course will extend the material of AP Calculus AB and will include the content that is necessary to take the AP Calculus BC exam.

### ***Analytical Calculus (BC+) - 11 12 (H) (core) Full Year***

Analytical Calculus is a full-year rigorous introduction to the fundamentals of differential and integral calculus differing from the BC

Calculus course by its emphasis on proof, precisely formulated definitions, problems requiring non-routine problem-solving skills, and the role of abstraction in developing general mathematical concepts. Students will be thoroughly prepared to take the BC AP Exam in May and all Analytical Calculus students are required to this exam. However, the scope of the course goes well beyond the preparation for the exam. Placement into the course is based on the student's performance in Advanced Analysis II or Discrete Mathematics II. Students usually go on to take Advanced Topics in Mathematics the following year. Success in the Analytical Calculus course will require a significant commitment of time and effort on the part of the student. This course is for students who want to spend extraordinary amounts of time tackling very difficult math problems.

### ***IB Mathematics SL - 12 (H) (core) Full Year***

Math IB SL offers a broad range of topics and provides a solid background for students who anticipate future studies and careers in areas that involve mathematics such as chemistry, economics, psychology, and business administration without the rigor required for Math HL. The Math IB SL curriculum consists of 6 topics: algebra, functions, trigonometry, vectors, statistics & probability, and calculus. This course will focus on writing portfolios, modeling data, statistics, probability, vectors, and putting everything together for the Math IB SL exam. Students are required to complete a math exploration or portfolio that can range from creating mathematical models to exploring observed phenomena to more abstract open-ended investigations that consider patterns and the formation of general rules.

### ***IB Mathematics HL - 12 (H) (Core) Full Year***

IB Math HL is a two-year curriculum designed by the International Baccalaureate Organization (IBO) in which you are given a grade based on tests (much like AP) and a mathematical essay (called a mathematical exploration). In our school, your calculus course counts as the first year of the curriculum, and the rest of the curriculum is covered senior year. The main topics covered in BCA's senior year IB Math HL course are vectors, complex numbers, statistics and probability. In addition, just about all topics previously learned in

pre-calculus and calculus are reviewed throughout the year. Your mathematical exploration is written on a topic of your choice according to a rubric designed by IBO. This course requires a thorough knowledge of just about all mathematical topics learned throughout your four years at BCA. Many problems are non-routine and require a true understanding of the interconnectedness of many mathematical disciplines. This course meets four days a week and requires about 3-5 hours per week for homework, review of class work, study for assessments, and completion of the mathematical exploration.

### ***Multivariable Calculus - 12 (H) (core) Full Year***

Multivariable Calculus is the equivalent of a typical third semester college calculus course. The course is a continuation of the BC Calculus course which is a prerequisite for enrollment. The students will learn to apply single-variable calculus concepts to vector and parametric functions and to expand these concepts to functions of more than one variable. There is an additional second order differential equations units designed to be an introduction to the study of differential equations. The computational platform Mathematica is an integral part of the course. Mathematica is used for demonstration and explanation and students will learn the basics of command-line computations in Mathematica. Structured labs and projects are a course requirement. There is also a culminating end-of-the year Mathematica project that is required.

### ***Data Structures - 12 (H) (core) Full Year (core)***

Data structures is a core course in the Department of Mathematics for students who have as a prerequisite AP Computer Science A or the equivalent. A reasonable comfort level with calculus is also a major asset. The course is aimed at students with a strong interest in Computer Science or closely related fields and is intended to be equivalent to the first-year university course for Computer Science majors.

The foundations of Computer Science including both fundamental data structures and the most important algorithms for manipulating and managing these data structures form the core of the content. The data structures covered include but are not limited to stacks, queues, linked lists, binary trees, hash tables and graphs. On the algorithmic side, we

engage in a rigorous discussion of how time and space requirements are measured, and apply these to sorting and searching, building and traversing data structures, and the theoretical underpinnings of algorithmic complexity including Turing Machines, uncomputability and the Halting Problem.

### *Advanced Topics in Mathematics - 12 (H) (core) Full Year*

This course is primarily for students who have completed Analytical Calculus, although extremely well qualified students who have completed BC Calculus may be recommended on occasion. The course begins with the notions of vector spaces, linear transformations and determinants, providing the necessary vocabulary from Linear Algebra to proceed to more advanced topics. We then cover Multivariate Calculus up through Greens Theorem, Stokes Theorem, and Gauss' Theorem. Finally, we discuss the basics of Complex Analysis and introduce enough calculus on the complex plane to rigorously prove the Fundamental Theorem of Algebra. There are 3 tests per trimester including a cumulative exam at the end of the trimesters. In addition, there are about 5 quizzes per trimesters. This course requires about 10 hours per week for homework and preparation for assessments.

### *Topics in Advanced Mathematics - 12 (H) (core) Full Year*

This is our most advanced course. Designed for the exceptionally well prepared student, this course covers material that is two years beyond the curriculum of BC Calculus. As such, the material varies from year to year, currently covering a sweeping introduction to the three cornerstones of mathematics, namely, Linear Algebra, Abstract Algebra, and Real Analysis. Vector spaces, linear operators, groups, fields and rings, and the topological underpinnings of calculus are covered. Emphasis is placed on rigor and proof. There are 3 tests per trimester including a cumulative exam at the end of the trimester. In addition, there are about 5 quizzes per trimester. This course requires about 10 hours per week for homework and preparation for assessments.

### *Statistics - 12 (H) (Core) Full Year*

Statistics introduces students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data without the rigor required for AP Statistics. The course is divided into four major themes: exploratory analysis, planning a study, probability, and statistical inference.

Throughout the course students will have hands-on and visual activities in the form of projects and experiments, ranging from M&M's to Carnival games to news broadcasts. Upon completion of this course students will look at the world differently because they will be able to construct an analysis of statistical data based on clear, critical thinking.

### *AP Statistics - 11 12 (H) (Core) Full Year*

This AP level course is designed for students who are ready for a more in depth study of statistical theory and its applications. The course introduces students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. The course is divided into four major themes: exploratory analysis, planning a study, probability, and statistical inference. Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. Probability is the tool used for anticipating what the distribution of data should look like under a given model. Statistical inference guides the selection of appropriate modes. The course covers descriptive and inferential statistics. At the end of the course, the students will be proficient in collecting, analyzing, and drawing inference from data. The students will acquire a new understanding and appreciation for the use of statistics in a wide variety of areas such as general science, finance, manufacturing, gaming, public health, insurance, mechanics, and others. In addition, students are expected to acquire proficiency using a TI-84 graphing calculator. Students will use web based applets to reinforce their understanding of concepts which lend themselves to the use of technology (i.e., normal curve, simple random samples, law of large numbers, probability, confidence intervals, correlation and regression, central limit theorem, normal approximation to the sample mean, and normal approximation to the binomial distributions). They will also be exposed to computer based output (Minitab) in their problem solving experience. Students are required to sit for the AP Statistics exam in May. Students will have approximately ten

assessments during each trimester including tests, quizzes, a project, and a final exam. Students should be prepared to spend 2-4 hours per week on homework.

### ***Strategies in Mathematics - 9 (elective) Trimesters 1 and 2***

This course is a supplemental support for a student's study of Algebra II and Trigonometry. It provides a rigorous, rapid review of Algebra I topics while also providing additional instruction on current topics of study in the concurrent Algebra II and Trigonometry course.

### ***Math Research - 9 10 11 12 (elective) Trimester***

Math Research prepares students for participation in the U.S. Mathematics Olympiads and the Intel Science competitions by conducting research in advanced topics in mathematics. The student takes this course on the recommendation of a faculty member. This elective may be taken multiple times.

### ***Advanced Problem Solving Seminar 9 10 11 12 (elective) Trimester***

The Course is designed to prepare students for math competitions such as AMC 10, 12, AIME, USAMO and IMO. Students are also introduced to math research and contests based on math research such as the Intel Talent Search, Siemens, NJRSF and ISEF.

## **MUSIC**

### ***Digital Keyboarding - 9 (H) (Core) Full Year***

Digital Keyboarding is a three-trimester AVPA/Music core course designed to fit the individual needs of the student. Beginner students in piano study fundamentals of piano playing, while the or for the advanced student studies keyboard harmony (transposition, harmonization and fundamentals of improvisation). Typical class involves a three-to-five minute session per student. Typical lessons are in two parts: performance of previous lessons assignment (with corrections as needed), and the new

assignment.

### ***Music & Society - 10 (H) (Core) Full Year***

Music and Society is an arts and humanities Course involving to the historical development of Western music: its definition, some of its origins, and the various basic genres (vocal, instrumental,) and its development over the ages, from its earliest beginnings in Gregorian Chant, through the various stylistic periods (Middle Ages, Renaissance, Baroque (first trimester); Viennese Classical period (second trimester); and the Romantic, Post-Romantic, 20<sup>th</sup> and 21<sup>st</sup> Century styles.

### ***Electronic Music Synthesis - 10 (H) (Core) Full Year***

Workshop is an AVPA/Music core course involving fundamentals of MIDI and proceeding through more advanced concepts based on the general skill level of the students registered for the course. That is, it will be designed to fit the individual needs of the students to whatever extent that is possible. Hands-on practice and the production of an original composition using the software MIDI program of MakeMusic's Finale is the main objective of the course. The first three to four sessions involve an instructor-based presentation of the software, its capabilities, and the various methods and skills the student will be expected to develop over the course of the course. The remaining weeks will involve an all-hands-on composition project, with only sparse teacher intervention to answer questions or to solve problems with hardware, etc. course is two-trimesters, and culminates each trimester with a CD of the students' original compositions.

### ***AP Music Theory - 11 (Core AVPA-M/Elective) Full Year***

AP Music Theory is a yearlong course and prepares the student for the College Board AP Exam. All portions of study are directly applicable to the student's musicianship. Beginning with the fundamentals of tone, intervals, and scale and triad construction, the course proceeds through phrase analysis and construction, Roman numeral harmonic analysis, non-chord tones, two voiced species counterpoint, four part chorale style

compositions, the dominant and non-dominant sevenths, viio7 and their inversions, analysis of segments of the standard repertoire, and analysis of binary and ternary forms. It should also be noted that ear training comprises nearly fifty percent of the exam and is covered extensively in this course. Sight singing, melodic, harmonic, and rhythmic dictation, and listening analysis of orchestral literature comprise a sizeable (approximately forty percent) of the curriculum. Workload: Classes meet four days weekly. Written assignments are given at an average of two per week. Assignments consist of two (sometimes three) tests, two (sometimes three) sight singing quizzes. In class melodic, rhythmic, harmonic dictation - collected for a grade - occurs an average of once weekly.

### *Advanced Problems in Music Theory - 12 (H) (Core) Full Year*

Advanced Problems in Music Theory is a three-trimester, twice-weekly course, and is a continuation of AP theory. Advanced Problems will involve the French, Italian, and German augmented sixth and Neapolitan chords, composition of fugue expositions, continuing studies in counterpoint, including twentieth-century counterpoint. Advanced harmonic analysis will include the late romantic literature and will begin analysis of twentieth-century music (Bartok, Stravinsky, etc.). Prerequisite: successful completion of AP Theory or the equivalent at a private music school or conservatory. Instructor will determine eligibility conducting, interpretation of music, performance preparation, and ensemble skills.

### *Senior Music and Media Seminar - 12 (H) (Core) Full Year*

Senior Music and Media Seminar is a studio class culminating with a formal, public presentation. Presentations include academic (music) lecture, lecture-recital, senior recital, class ensemble, teaching, or special project in technology. Application of media devices plays a key role in presenting the material to the public. The experience will foster academic leadership and recognition as one of the top musicians in our learning community. The course is required for all students in AVPA-Music (12<sup>th</sup> grade) and is not open to other students.

**Required Electives:** participation in a performance ensemble 2 out of 3 trimesters each year

### ***Concert Choir - 9 10 11 12 (Elective) Full Year One Trimester***

Concert Choir performs music in several styles and settings. Singing in Choir will enhance your vocal skills through exercises in sight singing, breath control and vocal technique. There are also several performance opportunities as well as off campus workshops, festivals and competitions. It must be understood that while choir is a one trimester elective, students must make a two trimester commitment to be in choir, and it must be two consecutive trimesters; that is, I & II or II & III. It must also be understood that you can make your trimester commitment to the choir by taking it in any combination of elective and project, as long as you commit yourself to being in choir two consecutive trimesters.

### ***Musicianship - 9 (H) (AVPA-M Core) Year Long***

Musicianship is a methods and technology course where students learn to play woodwind, brass, string and percussion instruments- including the development of modern instruments and their transposition- and apply them to tools used in performance. Additionally, students explore conducting techniques and rhythm dictation. A special project in electronic technology is also part of the curriculum. Prerequisites: ability to read music, permission of instructor. This is a required course for students in AVPA-Music program (9<sup>th</sup> grade) and is generally not open to other students.

### ***Concert Band - 9 10 11 12 (Elective) One Trimester***

Concert Band is a large ensemble that performs different styles of concert music. Instrumentation includes wind and percussion instruments. Activities involving performance skills, general musicianship and creative/critical thinking skills are emphasized during rehearsals. Membership first/second trimester is required for County, Regional, and All-State honors ensembles. Prerequisites: because the ensemble is focused on performing more challenging music, all students must qualify for membership through an audition. Please refer to the BCA Audition Policy for details.

### ***Orchestra - 9 10 11 12 (Elective) One Trimester***

Orchestra is a large ensemble that performs different styles of classical music. Instrumentation includes strings as well as a limited amount of wind and percussion instruments. Activities involving performance skills, general musicianship and creative/critical thinking skills are emphasized during rehearsals. Membership first and/or second trimester is required for participation in County, Regional, and All-State honors ensembles. The BCA Orchestra also shares a unique partnership with the North Jersey Philharmonic (a professional orchestra), which involves enrolled Orchestra students. Prerequisites: because the ensemble is focused on performing more challenging music, all students must qualify for membership through an audition. Please refer to the BCA Audition Policy for details.

### ***Jazz Band - 9 10 11 12 (Elective) One Trimester***

Jazz Band ranges anywhere in size from a small combo to a big band. Activities involving improvisation, performance skills, general musicianship and creative/critical thinking skills are emphasized during rehearsals. Membership first and/or second trimester is required for participation in County, Regional, and All-State honors ensembles. The Jazz Band performs on campus and gigs in jazz clubs and banquet halls. Prerequisites: because the ensemble is focused on performing more challenging music, all students must qualify for membership through an audition. Please refer to the BCA Audition Policy for details.

### ***Wind, String, Percussion or Bergen Arts Ensemble - 9 10 11 12 (Elective) One Trimester***

Ensembles are comprised of smaller, advanced-level groupings of instruments, which make up a viable ensemble capable of performing a program of music. This may be anything from a flute ensemble to a string quartet. Bergen Arts Ensemble performs music from cinema, international genres, or experimental music. Activities involving performance skills, general musicianship and creative/critical thinking skills are emphasized

during rehearsals. Membership first and/or second trimester is required for participation in County, Regional, and All-State honors ensembles. Ensembles perform on campus and at special events off campus. Prerequisites: because the ensembles are focused on performing more challenging music, all students must qualify for membership through an audition. Please refer to the BCA Audition Policy for details.

### ***Guitar & Mandolin Orchestra - (Elective) One Trimester***

Guitar & Mandolin Orchestra is a large ensemble that performs different styles of music. Instrumentation includes nylon-string (classical) guitars, acoustic bass guitars, mandolins, mandolas and mandocellos. The Guitar & Mandolin Orchestra performs several times a year, both on and off campus, and participates in various state, regional, national, and international festivals. Acceptance into this prestigious ensemble may require the student to commit to evenings and weekends. Activities involving performance skills, general musicianship and creative/critical thinking skills are emphasized during rehearsals. Prerequisites: because the ensemble is focused on performing more challenging music, all students must qualify for membership through an audition. Please refer to the BCA Audition Policy for details.

## **PHYSICS**

### ***Physics - 9 (H) AAST/AEDT (Core) Full Year***

This course is algebra-based and provides the basic principles of physics and applies these concepts to global phenomena. Emphasis is placed on developing a complete understanding of the nature of various effects and the ability to solve problems. Learning is achieved through hand-on experiments, projects, computer labs, multimedia technology, and class demonstrations. The curriculum covers the topics of mechanics, kinematics, dynamics, and conservation laws of energy and momentum.

### ***Intermediate Physics - 10 (H) AAST/AEDT (Core) Full Year***

This algebra-based course is a continuation of Physics 9. The course will

start with a review of vectors, energy, work, and power. After the review, six additional topics will be covered: Rotational Mechanics, Kinetic Theory and the Gas Laws, Temperature and Heat, Thermodynamics, Electrostatics and finally Electric current. The curriculum includes demonstrations, experiments, labs, and problem solving exercises.

*Advanced Physics - 11 (H) AAST/AEDT (Core) Full Year*

The goal of this course is to develop a deeper conceptual understanding of the principles of physics and examine the relationships which exist between physics and chemistry and biology. Topics to be covered include-mechanical waves and sound, optics, elements of quantum mechanics and elements of modern physics.

*Introduction to Physics - 10 (H) AMST/ABF (Core) Full Year*

This algebra-based introductory physics course is designed to provide AMST and ABF students with the basic principles of physics and applies these concepts to global phenomena. Emphasis is placed on developing a complete understanding of the nature of various effects and the ability to solve problems. Learning is achieved through hand-on experiments, projects, computer labs, multimedia technology, and class demonstrations. The curriculum covers the topics of mechanics, kinematics, dynamics, and conservation laws of energy and momentum

*Physics - 11 (H) AMST ABF (Core) Full Year*

This algebra-based introductory physics course is designed to provide AMST students with the basic principles in various areas of mechanics, thermodynamics, electromagnetism and optics with an emphasis on medical applications of various effects in physics. Major attention is devoted to the development of the conceptual understanding of major physical phenomena. Curriculum includes experiments, labs and problem solving exercises.

*Physics/Chemistry Lab - 9 (Core) Full Year*

The goal of this four mods/week course is to provide students with a hands on laboratory experience. Students perform basic experiments in various areas of chemistry and mechanics as they collect and analyze data. Several labs are based on computer simulations of various physics effects.

### ***Physics Lab - 10 AAST/AEDT (Core) Full Year***

The goal of this four mods/week course is to supplement the content of the Intermediate Physics - 10(H) core course with hands on laboratory experience. Students perform basic physics experiments in various areas covered in the core course, collect and analyze data, prepare the lab report that requires answers on related questions and problems. Data analysis typically involves application of a computer; several labs are based on computer simulations of various physics effects.

### ***Physics - 11 (H) ACHA, AVPA, ATCS, ABF (Core) Full Year***

This algebra-based introductory physics course is designed to provide ACHA, AVPA, ATCS, & ABF students with the basic physics principles in the areas of mechanics, waves, electromagnetism, and optics. Major attention is devoted to the development of a conceptual understanding of major physical phenomena. The curriculum includes projects, laboratory investigations, demonstrations, and problem-solving activities.

### ***Pre-Engineering Research - 10 11 12 (Elective) One Trimester***

This course is designed to guide students who want to design new inventions. Promising ideas are pursued from the prototype stage all the way to the final patent for the invention, where appropriate. Students are encouraged to participate in regional and national engineering competitions and science fairs. Permission of instructor is required.

### ***AP Physics C - 12 NJIT Articulation (Core) Full Year***

AP Physics C is the calculus-based physics course created by the College Board for preparation in taking the AP Physics C exam in May. Students are expected to either have already completed at least one year of calculus

before taking this course, or are scheduled to take Calculus BC+ concurrently with this course. A strong “A” average in the previous physics course is also expected. AP Physics C is divided into two sections: Mechanics and Electromagnetism. Many, but not all, of the concepts taught should already be familiar to the students, but will be discussed at a much more sophisticated level. Students must have the problem-solving skills necessary to generate both numerical and symbolic solutions to questions. Laboratory assignments will also be given periodically, as lab-based questions have been added to the AP exam in recent years. Students will master gathering, analyzing, presenting, and interpreting physical data. Findings will be presented in formal lab reports.

### ***IB Physics SL -11 ABF (Core) Full Year***

IB Physics SL is the “Standard-Level” algebra-based physics course of the International Baccalaureate Diploma Program. It is designed for junior ABFIB students in order to fulfill their IB science requirement who do not wish to take IB Environmental Systems senior year. Students will become familiar with the fundamental laws and theories of classical mechanics, thermal physics, waves, electromagnetism, optics, modern physics, alternative energy sources, and climate change, and will develop problem-solving skills in order to generate both numerical and symbolic solutions to questions. Laboratory work will be a major component of this course. Students will spend a mandatory 20 hours mastering gathering, analyzing, presenting, and interpreting physical data. Students will also be required to design, execute, and report on a lab experiment of their own design (“Internal Assessment”). In addition, students will take part in a 10-hour interdisciplinary project of the class’ choosing (“Group-4 Project”).

### ***Research in Optics - 10 11 12 (Elective) Trimester***

Students in the Optics Research program carry out projects/experiments in fields such as Laser Interferometry, Fiber Optics and Holography. The research is initially guided by Dr. Dogru to assist the student getting familiar with the methods and instruments used. Various applications of interferometry is studied and verified through advanced experiments. The work includes understanding the experimental setup, taking data, analysis of data and presentation in a format that is appropriate for an audience

that does not have the background necessarily. Each experiment will be unique in the sense that it may require different setups and analysis methods as well as unique data collection techniques. Students are encouraged to think about the project and extend it to different areas that may produce new/original ideas. The program is supported through interactions with outside resources and experts in their respective fields. The program is open to any student in grades 10, 11 and 12.

### *Physics Exploration - (Elective) Trimester*

Physics Exploration is a one trimester course for students from all Academies and grade levels. Students explore selected topics in depth, with the emphasis on related experiments and problem solving skills. Students may design a new experiment or choose to work with classical experiments in physics using means and supplies available in school. Possible topics include mechanics, thermodynamics, electromagnetism, and optics. The background and needs of students are evaluated each trimester to determine actual topic(s) to be covered in a particular trimester.

## **TECHNOLOGY**

### *Introduction to Computer Science - 9 (Core ATCS) Full Year*

This course introduces students to computer science and programming. The course begins its introduction via a study of the Python language; including basic input and output, conditions, loops, modularization via functions, classes and objects, and graphics programming. The course then continues with an introduction to Java programming, preparing the students for AP Computer Science in the subsequent year. For Java, students learn the basic language structure, control flow, and class and object design.

### *C and Data Structures - 10 (Core ATCS) Full Year*

This course develops the student's ability to understand and create computing systems. In the first half of the course, students move beyond the abstractions of modern programming languages and learn how the computer understands and executes programs. To accomplish this understanding, students study the basics of assembly language, UNIX shells, and the C Programming language with an emphasis on pointers. In the second half of the course, students explore advanced topics in Java, with an emphasis on developing solid, tested code and on learning many standard data structures and how to use them effectively in programs.

### ***Advanced Topics in Computer Science - 11 (Core ATCS) Full Year***

Advanced Topics explores a number of high-level computer science concepts, such as artificial intelligence, functional languages, finite state machines, regular expressions, and Turing completeness. The course culminates in the creation of a new computer language and a language interpreter.

### ***Java Programming - 10 (Core) Full Year***

Through this course, students develop a robust understanding of the design and implementation of applications using the Java programming language. Students will be able analyze substantial real-world problems and develop software solutions for those problems using Java. Students will develop programs demonstrating their understanding of data types, control structures, classes and objects, basic algorithms, and event-based graphics.

### ***AP Computer Science - 9 10 11 12 (Core ATCS/Elective) Full Year***

Understand core aspects of computer science which you can use to create solutions that are understandable, adaptable, and when appropriate, reusable. The design and implementation of computer programs to solve problems involve skills that are fundamental to the study of computer science. This includes the development and analysis of algorithms and fundamental data structures, and the use of logic and formal methods. Prerequisite for non-ATCS students: Intermediate to Java

## ***Capstone - 12 (Core) Full Year***

This class is a capstone project for which the student utilize four years of education in computer science to design, program and fabricate a year-long project. Students create software that pushes the envelope against real-world problems. They work in conjunction with an outside mentor to ensure that what they create will truly be useful.

## ***Experimental Technology I - 9 (Core) Full Year***

The Experimental Technology course is a full year core course for AAST Freshman. In the first trimester portion of the course, taught in the Science Laboratory, the overall goal is to develop an understanding of how to think like a research scientist, how to identify appropriate and reliable scientific information, formulate hypotheses, design and conduct an experiment, analyze data and come to a conclusion. Additionally the goal is to have students learn how to support their research with the appropriate technology and use technology to present their findings. The course will incorporate video, animation, and imaging such as that from the TEM, SEM and bright field microscopes as well as everyday laboratory activities.

## ***Introduction to Engineering Design I - 9 (Core) Full Year***

Introduction to Engineering Design I (IED I) is a three trimester course which introduces students to topics of HTML programming, 2 and 3 dimensional computer aided design (2D & 3D CAD) and oral and written presentation. Students will learn by lecture, work-book exercises and independent and team projects. This course will give the inexperienced student the ability to understand the process of web design and the visualization tools of CAD in 2D and 3D. Successful completion of this course will allow students to move on to the course Introduction to Engineering Design II, where a more in-depth look at 3D CAD and animation is taken. IED I work hand in hand with the three trimester course Technology I. Introduction to Engineering Design I will teach the students how to implement their projects while Technology I will assist in the research and content development portion. The IED I course is broken

into four modules, each covering several weeks. Module one will cover web page design and Hypertext Markup Language (HTML). Module two will focus on 2D computer aided design using Autodesk Inventor CAD software. Module three will be devoted to learning the basics of 3D rendering. Module four will be a culminating project, which will require the students to combine their knowledge and skills learned in the previous sections as well as in Technology I in the creation of a product. Modules will be taught in a project based atmosphere. Lectures are minimized with emphasis placed on hands on learning. The course will introduce topics, which familiarize students with techniques used by professionals in a work and project environment. The nature of the subjects covered allows and requires integration with mathematics, Engineering and Architecture. Focus is on student driven projects with clear, analytical goals, accepted techniques for research and final written, oral and multimedia web presentations.

### ***Introduction to Engineering Design II - 10 (Core) Full Year***

Introduction to Engineering Design II (IED II) is a three trimester course which introduces students to topics of 2 and 3 dimensional computer aided design (2D & 3D CAD) computer animation and oral and written presentation. The prerequisite for this course is Introduction to Engineering Design I. Students will learn by lecture, work-book exercises and independent and team projects. This course will give the inexperienced student the ability to understand the process and visualization tools of CAD in 2D and 3D. IED II works hand in hand with the three trimester course Technology II. Introduction to Engineering Design II will teach the students how to implement their projects while Technology I will assist in the research and content development portion. The IED II course is broken into four modules, each covering several weeks. Module one will focus on 2D and 3D computer aided design using Autodesk Inventor CAD software. Module two will be devoted to learning the basics of mechanical drawing and layouts. Module three will concentrate on assembling 3D CAD objects and computer animation. Module four will be a culminating project, which will require the students to combine their knowledge and skills learned in the previous sections as well as in Technology II in the creation of a product. Modules will be taught in a project based atmosphere. Lectures are minimized with

emphasis placed on hands on learning. The course will introduce topics, which familiarize students with techniques used by professionals in a work and project environment. The nature of the subjects covered allows and requires integration with mathematics, Engineering and Architecture. Focus is on student driven projects with clear, analytical goals, accepted techniques for research and final written, oral and multimedia web presentations.

### ***Introduction to Electronics - 9 (Core) Full Year***

The course is designed to provide a practical - hands on - introduction to electronics with a focus on circuit design. In this full year core course students will learn how to identify electronic components, learn the difference between analog and digital circuits, assemble 555 timers and 74000 IC circuit. Throughout the course students will use modern "virtual software" as test-beds for understanding electronics. Additionally, students will learn how to configure microcontroller circuits and sensors, code algorithms and learn syntax errors in code. The course will integrate demonstrations and laboratory examples with lectures on the foundations. The aim of the course is to provide students with the practical knowledge necessary to design and prototype their own circuit.

### ***Principles of Engineering - 10 (Core) Full Year***

Principles of Engineering (POE) is a three trimester course which introduces students Material Science, Cost analysis, production techniques and simple machines. The prerequisite for this course is Introduction to Engineering Design I. Students will learn by lecture, work-book exercises and independent and team projects. This course will give the inexperienced student the ability to understand the process and visualization tools of Engineering. POE works hand in hand with the three trimester course is broken into eight modules. Module one will focus on Types of Engineering. Module two will be devoted to Communication and documentation. Module three will concentrate on Design Process Module four concentrate on Engineering Systems. Module Five will be a Strength of Materials and Module Six will concentrate on Materials Testing in Engineering. Module Seven will concentrate on Reliability and Module Eight Concentrate on Dynamics/Kinematics. In culminating project,

which will require the students to combine their knowledge and skills learned in the previous sections as well as in Technology II in the creation of a product. Modules will be taught in Engineering Calculations and notes with a project based atmosphere. Lectures are minimized with emphasis placed on hands on learning. The course will introduce topics, which familiarize students with techniques used by professionals in a work and project environment. The nature of the subjects covered allows and requires integration with mathematics, engineering calculations and re-engineering project. Focus is on student driven projects with clear, analytical goals, accepted techniques for research and final written, oral and multimedia web presentations.

### ***Intermediate Electrical Engineering - 11 (Core) Full Year***

Intermediate Electrical Engineering is a junior year core course for AEDT students. The course builds on the freshman year course. Intermediate Electrical Engineering will examine passive components, and will compare their operation and dependence on physical variables. Active components, components based on semiconductors, including diodes, LED's and bipolar transistors will be covered. An introduction to analog electronic principles and basic operational amplifier circuits will be included. Finally the course will include an introduction to microcontrollers. The course will expose students to electrical engineering instruments, including meters, oscilloscopes, signal generators and power supplies. Although the course will include assessments such as tests and homework a major part of the class will be based on lab activities and projects.

### ***Advanced Electrical Engineering - 12 (Core) Full Year***

Advanced Electrical Engineering is a senior year core course for AEDT students covering advanced topics in electrical engineering. The course will examine advanced analog electronics including integrators, differentiators, active filters and sensor interfaces. Students will have the opportunity to design, build and test electrical systems that include, a sensor interface, filtering and amplification. Students will also be introduced to higher power semiconductors including MOSFETs, solid state relays and driver ICs for use in electromechanical systems. Embedded systems will also be covered including bus systems data

acquisition circuitry and control systems with feedback. The use of electronic design automation software, from schematic capture through PCB layout and Gerber file generation, will be covered. Students will be expected to work on specification based projects and develop their own designs, which they will document.

### ***Computer Integrated Manufacturing- 11 (Core) Full Year***

The major focus of CIM includes the use of technology for product development. Topics include history of manufacturing, control systems, automation, power systems, robotics, and types and integration methods. Students will review in-house technologies and develop competency on specific machines with small design for manufacturing type projects. Prerequisite: Satisfactory completion of Introduction to Engineering Design II. Approved Project Development Contract is Required. Shop Safety Test is Required.

### ***Engineering Capstone - 12 (Core) Full Year***

This capstone course builds upon the skills learned in I.E.D., P.O.E., Electronics, C.I.M., and traditional Academic coursework. Engineering Capstone includes the fabrication of student inventions, creation of architectural designs or participation in engineering competitions. Students research the need for a new or improved product of their own choosing; find similar products, make improvements, and develop a design brief. Creation of Engineering Drawings and 3D CAD files and animations bring students to the final culmination of a working prototype and a product presentation, which describes, displays and helps sell the product i.e. to investors. Prerequisite: Satisfactory completion of Introduction to Engineering Design II. AEDT Seniors must take the NOCTI Pre-Engineering exams as midterm and final. Participation in Engineering Competitions may require extra time during free and afterschool hours. Approved Project Development Contract is Required. Shop Safety Test is Required.

## **THEATRE ARTS**

### *Acting I - 9 (H) (Core) Full Year*

This course is the first component in a four year required sequence in Acting. Students work with a series of physically based techniques and unscripted strategies such as Viewpoints and improvisation in order to release and open emotional and physical range. This work stimulates the imagination, puts emphasis on physical actions, encourages acting with the whole body, and aids in ridding the actor of self-conscious mannerisms. The work focuses on the actor and his or her creative powers.

### *Acting II - 10 (H) (Core) Full Year*

In this course, basic acting technique is introduced with emphasis on the rehearsal process through scene study. Areas of focus include: ensemble playing, emotional recall and sense memory, script analysis with a focus on dramatic content, values and style, characterization and scoring a role. The interrelationship of actor and director in the rehearsal process is explored. Material is taken from modern American realism (Miller, Williams, Hellman, Wilson, etc.) Additionally, playwriting is taught to fully amplify skills in creating given circumstances, character development and motivation, and dialogue.

### *Acting III - 11 (H) (Core) Full Year*

The purpose of this course is to develop a close, organic connection between the actor and his or her technique. Each student is encouraged to investigate and utilize his or her widest possible range and to develop an individual method of work. All students will prepare 4 monologues drawn from contemporary and classical plays and will explore audition technique in preparation for future training in college or conservatory or work in the profession.

### *Acting IV - 12 (H) (Core) Full Year*

This advanced scene study class focuses on the exploration of the text and the utilization of technique to determine actor choices for the particular stylistic demands of a text and its period. Scene studies from a variety of

major theatrical periods and styles will be rehearsed, examining them in context of each play's content, structure, period, and movement to arrive at a valid character interpretation. Special emphasis is placed on period research and evidencing that research in presentation.

### *Theatre History I - 9 (H) (Core) Full Year*

An historical exploration of global theatre arts in relation to developing Eastern and Western world civilizations, this course includes a study of theatre architecture, styles of acting, the development of stage costume and the range of dramatic literature from the Greeks through the closing of the theatre in Great Britain in 1642. Special emphasis is placed on discovering how the institution of the theatre serves as an expression of social, economic, philosophical, religious and cultural movements of a specific historical period.

### *Theatre History II - 10 (H) (Core) Full Year*

Beginning with Romanticism and ending with contemporary theatre practices, this course explores major periods and trends in the theatre through an examination of performance environments, theatre architecture, design, acting styles, scripts, audiences and social and cultural conditions of the times.

### *Voice and Speech for the Actor I - 11 (H) (AVPA-T) Core/Elective (instructor permission required)*

This course develops the actor's vocal range and quality along with training in the use of standard American speech. Using the training techniques of the Alexander Method and the work of Cicely Berry and Kristin Linklater, students are introduced to a variety of physical techniques in order to release tensions and gain control over vocal range, placement and flexibility.

### *Directing - 12 (H) (Core) Full Year*

This course introduces the student to theory and techniques of stage

direction. Basic director's concepts are studied and applied to scenes and short plays. Work includes: exercises in stage visualization, picturization, composition and movement; analysis of scenes with emphasis on the theatrical content of scripts; focus on director preparation in such matters as casting procedures, rehearsal technique and director/actor relationship; and choice and execution of production values (lighting costume, sound). Student director's work culminates in directing a fully staged and produced one-act play.

### ***Dance I - 9 (AVPA-T required) 2 trimesters***

This course prepares actors for dance roles in the musical theatre by introducing basic dance theory and terminology while developing stretch, strength, and coordination towards proper dance technique. Students learn beginning ballet and tap. The level of the course is determined and differentiated by the level of the students. In freshmen ballet the focus is on change of weight, centering or finding your vertical axis and coordination of the arms and legs. In freshmen tap the focus is on musicality, physical memorization and change of weight.

### ***Dance II - 10 (AVPA-T required) 2 trimesters***

Students continue their study of ballet and add beginning jazz dance to develop the skills necessary for ensemble and solo work in the musical theatre. In sophomore ballet the focus is on balletic line, port de bras, epaulement and positioning of the feet. Coordination and physical grace are also emphasized. In sophomore jazz, students study choreographer Jerome Robbins and learn "Dance at the Gym, and Mambo" from the musical West Side Story. In addition, they also learn a routine based upon the 1920's Charleston. The class begins with a jazz warm-up emphasizing body isolations and based on technique learned from ballet classes.

### ***Dance III - 11 (AVPA-T required) 2 trimesters***

Students increase their proficiency in ballet and jazz dance. Junior ballet introduces more advanced steps and the focus is on control, change of direction, finesse and performance. Whatever technical level each student has achieved, the core of the class will be to attain grace, confidence and

musicality in their movements. Junior jazz dance spotlights choreographer Bob Fosse. Students will learn an adagio combination choreographed by Fosse called 'Cool Hand Luke' and will also learn his audition combination commonly called "Tea for Two." Students will also learn a fast paced swing dance combination. The jazz class begins with a warm up emphasizing body isolations and technique learned from ballet class.

### ***Dance IV - 12 (AVPA-T required) 2 trimesters***

Students increase their proficiency in jazz and study the principles of modern dance. Senior dance begins with jazz and each year, the warm up becomes more complex in order to develop technique. The warm up for senior jazz flows quickly from one exercise to another so that the warm up is much like a dance in itself. The focus in senior jazz is musical theatre dance. The students will learn two musical theatre combinations and will have opportunity to choreograph during one of those combinations. In addition, a contemporary jazz piece will be taught. The final dance class is modern where students will learn the principles, history and technique of beginning modern dance. Students will learn an original piece by Doris Humphrey. Students also have a choreography project where they research one of four modern dance pioneers and create their own work based upon their modern dance pioneer.

### ***Voice and Speech for the Actor I - 11 (H) (AVPA-T) Core/Elective (instructor permission required)***

This course develops the actor's vocal range and quality along with training in the use of standard American speech. Using the training techniques of the Alexander Method and the work of Cicely Berry and Kristin Linklater, students are introduced to a variety of physical techniques in order to release tensions and gain control over vocal range, placement and flexibility with a special emphasis on complex and classical texts.

### ***Theatrical Production/Fall Play - 10 11 12 (Elective) Trimester One***

In this course student actors undertake the tasks necessary to produce a

full-length, fully mounted straight play. Dramatic analysis, dramaturgy, character development, collaboration with designers and technicians, stage management, working with a director, rehearsal process, costume and makeup are topics addressed in this hands-on course/production experience. In addition rigorous attention is given to ensemble building. (Meets four days a week mods 25-27 plus an hour and one half hours after school each day.)

### ***Musical Theatre - 9 10 11 12 (Elective) Trimester Two***

In this course student actors undertake the tasks necessary to produce a full-length, fully mounted musical theatre piece. Presentational musical theatre technique in acting voice and dance is developed with rigorous attention given to ensemble building. (Meets four days a week mods 27-27 plus an hour and one half hours after school each day).

### ***One-Act Play - 9 10 11 12 (Elective) Trimester Three***

In this course student's work with senior student directors to produce a one-act play. Topics such as dramatic analysis, character development, working with a director, stage management, rehearsal process, costume, props and makeup are addressed in this hand-on course/production experience. (Meets two days each week mods 25-27 plus after school time two weeks prior to the final performances.)

### ***Theatre Tech and Design - 9 10 11 12 (Elective)***

Stage Management, Costume Design, Design for the Theatre, and Stagecraft electives are open to all academies. Students engage in real-world production techniques creating costumes, scenery, and props for BCA's award-winning mainstage productions, learning sophisticated skills including sewing, dying, rendering, scenic painting, props, and scenic construction. Lighting and sound designers work on all BCA and outside venue events. Stage Management students run all department productions and assemblies working alongside professional NYC designers, playwrights, fight directors, and musicians leading to important job

contacts and placement in some of the best University Design/Technology programs in the country.

***Musical Theatre Workshop - 9 (AVPA-T Required Project)***  
***Trimester 1***

The project allows students to explore the problems unique to the musical theatre with emphasis on the expression of a dramatic situation through song interpretation and character. Students explore song material drawn from major periods of the American musical and present scene-song studies. Sight singing skills and musicianship are also emphasized. Research and reading in the history of the musical theatre are included

***Playwriting - 9, 10, 11, 12 (Elective)***

This one trimester course is structured in such a way that as the playwriting form is examined and studied, the student begins developing and writing a one act play. Any problems that a student encounters in the development of the play are addressed in a hands-on fashion not only through suggestions from the teacher but also from the writer's fellow classmates. Included in the study of playwriting are exercises in creating scenarios, developing characters, and writing dialogue. Group discussions are an integral part of developing the one-act, especially in the early stages of scenario and character development. At the end of Playwriting, the student will have completed a rough draft of his or her play.

***The Business of Theatre - 11 (AVPA-T Required Project) Trimester 2***

Through research, field trips, video conferences, and guest speakers students will explore theatre, film and television as a profession and as a business. Topics include portfolio preparation, resumes and pictures, union memberships, agents, job opportunities, auditions, interviews, and advanced training.

## **WORLD LANGUAGES**

***Mandarin I-II - 9 (Core) Full Year***

Mandarin I-II is a pre-IB course. It is an accelerated preparatory course in which two years' of Mandarin curriculum will be covered in one year. The course is designed for students with minimal or no prior Mandarin exposure. Upon completing this course students will be able to share and comprehend simple and familiar language closely related to personal or everyday life – such as information about names, families, hobbies, foods and drinks, household items, birthdays, and appearance. In this course students will learn to write 100-30 characters, and will be able to read brief texts and answer simple written questions. Students will achieve a novice-mid level across all four language skills (Speaking, listening, reading, and writing). Each unit will be taught through a series of active and interactive tasks. In this class each student will also give three major presentations: a research project on a Chinese Province, presented in English; a Power Point Presentation on their family, presented in Chinese, and a skit in Mandarin. We will use the 你好(Ni Hao) Textbooks 1 and 2 published by China Soft.

### *Mandarin II – 10 (Core) Full Year*

In this course, students will develop their Mandarin Chinese language skills to make basic conversations on topics such as schools, grades, friends and classmates, birthdays, daily routine, leisure activities, rooms, furniture, colors, and clothing. By the end of the course students will be able to express personal meaning in a basic way, and successfully handle a number of uncomplicated communicative tasks and topics related to their own life and immediate environment.

### *Mandarin III – 11 (Core) Full Year*

In this course, students will develop their Mandarin Chinese language skills to make basic conversations spontaneously on topics such as colors, clothes, purchasing, food and health, ordering over the phone, dining in, and weather. By the end of the course students will be able to express personal meaning and successfully handle a number of uncomplicated communicative tasks and topics in an environment that is outside of their home and school, but is relevant to their daily life.

### ***Mandarin IV - 12 (Core) Full Year***

The goal of Mandarin IV is both to teach students new material and to push students to use previously learned material in novel situations. By the end of the course students should be able to understand simple discourse closely related to personal experience or everyday life, exchange ideas with others on familiar topics, and give descriptions in simple language. They will be able to recognize 200-250 characters, read simple texts, and hold written conversations at the sentence level. Students will achieve a novice-high level across all four language skills (speaking, listening, reading, and writing). Major projects completed in this course include a written Treasure Hunt and an Infomercial. We will use a variety of resources including the 你好 (Ni Hao) 3 Textbook published by China Soft.

### ***French I/II Accelerated - 9 (H) (Core) Full Year***

This course is designed for freshman who are studying French for the first time and need to be in Français III by their sophomore year, and for freshmen who have had some exposure to French but are not yet prepared for Français II. It is an accelerated course that meets 12 mods per week instead of 8. In this course students are introduced to the many countries in which French is spoken and develop the basic skills necessary to communicate effectively in typical, everyday situations. Working within the framework of familiar material, they develop the ability to comprehend the general meaning of simple instructions, questions and statements in French; respond orally in French to cues or questions; demonstrate a general understanding of written sentences and paragraphs at the elementary and low intermediate levels; and construct sentences in compositions, skits and presentations using a variety of verbs in the indicative mode of the present and passé composé tenses. The themes discussed include: meeting people, telling time, describing familial relationships, ordering in a restaurant, shopping, clothing, sports, daily routines, cultural pastimes and health.

### ***French II - 9 (H) (Core) Full Year***

In this course students continue working on oral and written proficiency in French, demonstrating an increasing ability to speak and write within the limits of learned structures. The central grammatical points covered in this course include: the partitive, regular and irregular verbs in the present and passé composé tenses, reflexive verbs in the present tense, and such irregular verbs as savoir, connaître, ouvrir and dormir. The thematic units that provide a context for these elements include: school activities, food, sports, daily routines, cultural pastimes, health and medicine, telecommunications and trips abroad.

### *French III – 10 (H) (Core) Full Year*

In Français III students continue working on oral and written proficiency in French as complex reading passages move to the forefront of the curriculum. The grammatical foci of this course include: the formation and uses of the imperfect tense, negative expressions, the subjunctive mode, comparative and superlative constructions, direct and indirect object pronouns and the fundamental relative pronouns. The thematic units that provide a context for these elements include travel, everyday life and leisure time.

### *IB Français IV, V language B HL – 11 & 12 (Core) Full Year*

The IB Diploma Programme language B course provides students with the opportunity to acquire or develop an additional language and to promote an understanding of other cultures through the study of language. The course allows students to access the target language by studying it as a beginner or as someone with prior experience of the language. Language B is designed for students who possess a degree of knowledge and experience in the target language. Programme courses, which are to provide students with:

- a broad and balanced, yet academically demanding, programme of study
- the development of critical-thinking and reflective skills
- the development of research skills
- the development of independent learning skills
- the development of intercultural understanding.

The assessments aim to test all students' ability to understand and use the language of study as well as key

concepts through: • learning a language by engaging with its use and meaning within a social framework • developing receptive, productive and interactive skills in the language of study. Students' success in the language B standard level course is measured by combining their grades on external and internal assessment. Curriculum Overview The language B syllabus approaches the learning of language through meaning. Through the study of the core and the options at SL and HL, plus two literary works at HL, students build the necessary skills to reach the assessment objectives of the language B course through the expansion of their receptive, productive and interactive skills. SL and HL are differentiated by the recommended number of teaching hours, the depth of syllabus coverage, the study of literature at HL, and the level of difficulty and demands of assessment and assessment criteria. The core – with topics common to both levels – is divided into three areas and is a required area of study. • Communication and media • Global issues • Social relationships In addition, at both SL and HL, teachers select two from the following five options. • Cultural diversity • Customs and traditions • Health • Leisure • Science and technology Also, at HL, students read two works of literature Assessment for language B higher level (SENIOR YEAR) The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma. Prerequisite French III.

### *IB Français IV, V language B SL - 11 & 12 (Core) Full Year*

The IB Diploma Programme language B course provides students with the opportunity to acquire or develop an additional language and to promote an understanding of other cultures through the study of language. The course allows students to access the target language by studying it as a beginner or as someone with prior experience of the language. Language B is designed for students who possess a degree of knowledge and experience in the target language. Programme courses, which are to provide students with: • a broad and balanced, yet academically demanding, programme of study • the development of critical-thinking and reflective skills • the development of research skills • the development of independent learning skills • the development of intercultural understanding. The assessments aim to test all students' ability to understand and use the language of study as well as key

concepts through: • learning a language by engaging with its use and meaning within a social framework • developing receptive, productive and interactive skills in the language of study. Students' success in the language B standard level course is measured by combining their grades on external and internal assessment. Curriculum Overview The language B syllabus approaches the learning of language through meaning. Through the study of the core and the options at SL and HL, plus two literary works at HL, students build the necessary skills to reach the assessment objectives of the language B course through the expansion of their receptive, productive and interactive skills. SL and HL are differentiated by the recommended number of teaching hours, the depth of syllabus coverage, the study of literature at HL, and the level of difficulty and demands of assessment and assessment criteria. The core – with topics common to both levels – is divided into three areas and is a required area of study. • Communication and media • Global issues • Social relationships In addition, at both SL and HL, teachers select two from the following five options. • Cultural diversity • Customs and traditions • Health • Leisure • Science and technology Assessment for language B standard level (SENIOR YEAR). The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma. Prerequisite French III.

### *Spanish I/II Accelerated – 9 (H) (Core) Full Year*

Spanish I/II will develop the student's communicative competency in the language. Through small group tasks and demonstrations, students will explore the culture, art, music, geography, regions, products, industries, customs and cuisine of the Iberian Peninsula and Latin America. During the first trimester, students will learn how to introduce and describe themselves, respond to classroom directions, tell time, talk about things related to the calendar, describe the weather, compare hemispheres, express likes, describe personality traits, talk about school and classrooms, describe food and compare the cuisine of the countries. Students will prepare some regional food specialties while talking about Spanish food and comparing eating practices.

In the second trimester, students will discuss places to go after school, activities and leisure time, will describe families and compare parties and

celebrations, students will learn how to order in a restaurant and compare social etiquettes for celebrations. Students will organize a celebration and present their family tree. In the third trimester, students will describe the house and its parts, compare housing in different countries, shop for clothing, talk about plans, desires and preferences, describe and compare stores and shopping practices and narrate in the past. Students will present their ideal house and will create a touristic brochure. At the end of the course, students will be confident enough to offer suggestions for themes and will participate in an open-structure class.

Materials may include:

“Realidades” 1 and 2 levels. Pearsons. Textbook and workbook “Chicos, Chicas” levels 1 and 2. Ed. Edelsa, Spain Textbook and workbook “Gente joven” levels 1 and 2. Difusion, Spain. Textbook and workbook Workbook Spanish First Year. Ed. Amsco, USA An array of authentic materials in the Spanish Language.

### ***Spanish II - 9 (H) (Core) Full Year***

Spanish II will develop the student’s communicative competency in the language. Through small group tasks and demonstrations, students will explore the culture, art, music, geography, regions, products, industries, customs and cuisine of the Iberian Peninsula and Latin America. During the first trimester students will learn about their pastimes, sports and hobbies while comparing those practices in several countries. They will create an interview with a famous Hispanic player. Students also will talk about Spanish cities and shopping practices in those cities. They will learn about etiquette for gifts and celebrations. They will write letters talking about borrowing money and buying for appropriate gifts. During the second trimester, students will talk about how clothing and fashion express who we are. They will also talk about their houses and chores. They will present a skit wrapping up the units from the beginning of the year talking about shopping practices and describing cities. In the third trimester, students will prepare some regional food specialties while talking about Spanish food and comparing eating practices. They will understand how to narrate and describe past events. Students will present a video of a cooking experience and prepare the food for the class. At the end of the course, students will be confident enough to offer suggestions for themes and will participate in an open-structure class.

Materials may include: “Chicos, Chicas”. Ed. Edelsa, Spain Textbook and workbook “Gente joven” levels 1 and 2. Difusion, Spain. Textbook and workbook

An array of authentic materials in the Spanish Language.

### *Spanish III - 10 (H) (Core) Full Year*

The main goal of this course is to advance the students’ abilities to communicate in Spanish Language. We will discuss issues related to the culture of Spain, Latin America and Latinos in the US. Special focus will be directed towards oral activities and reading in the cultural context of Spain and Latin America. Spanish III will provide the student with an active learning experience by combining rich and thought-provoking content. The class will take them on a cultural tour of the Spanish-speaking world through short films, documentaries, cultural readings, authentic literature, and contemporary music. During the first trimester, students will talk about their feelings and emotions. They will describe themselves and their relations. After researching about melodramatic genre in Latino culture, they will present a soap opera in Spanish. They will show confidence in the use of present tense and pronominal verbs. During the second trimester, students will recall events from the past. They will narrate and describe in the past while talking about childhood and family heritage. They will watch an authentic movie about immigration and will create a storyboard and skit retelling the plot. While using past tenses they will also retell their biographies and fairy tales. During the third trimester, students will research about natural resources in Latino countries and environmental policies. They will create an infomercial about nature and ongoing environmental problems emphasizing hypothetical statements and conditions. At the end of the course, students will be confident enough to offer suggestions for themes and will participate in an open-structure class.

Materials may include:

- Spanish Two Years Workbook (Amsco)
- “Chicos, Chicas” level 3. Ed. Edelsa, Spain Textbook and workbook
- “Gente joven” level 3. Difusion, Spain. Textbook and workbook
- Joven.es levels 3 and 4 (Edelsa) ;
- Imagina(Vista Higher Learning);
- DELE practice (Edelsa).

- Authentic materials, songs and films IB Español IV, V Language B SL - 11 & 12 (Core) Full Year The IB Diploma Programme language B course provides students with the opportunity to acquire or develop an additional language and to promote an understanding of other cultures through the study of language. The course allows students to access the target language by studying it as a beginner or as someone with prior experience of the language. Language B is designed for students who possess a degree of knowledge and experience in the target language. Programme courses, which are to provide students with:
- a broad and balanced, yet academically demanding, programme of study
  - the development of critical-thinking and reflective skills
  - the development of research skills
  - the development of independent learning skills
  - the development of intercultural understanding.
- The assessments aim to test all students' ability to understand and use the language of study as well as key concepts through:
- learning a language by engaging with its use and meaning within a social framework
  - developing receptive, productive and interactive skills in the language of study.
- Students' success in the language B standard level course is measured by combining their grades on external and internal assessment.
- Curriculum Overview: The language B syllabus approaches the learning of language through meaning. Through the study of the core and the options at SL and HL, plus two literary works at HL, students build the necessary skills to reach the assessment objectives of the language B course through the expansion of their receptive, productive and interactive skills.

SL and HL are differentiated by the recommended number of teaching hours, the depth of syllabus coverage, the study of literature at HL, and the level of difficulty and demands of assessment and assessment criteria. The core – with topics common to both levels – is divided into three areas and is a required area of study.

- Communication and media
- Global issues
- Social relationships

In addition, at both SL and HL, teachers select two from the following five options.

- Cultural diversity
- Customs and traditions
- Health
- Leisure
- Science and technology

Assessment for language B standard level (SENIOR YEAR). The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma

## *IB Español IV, V Language B HL - 11 & 12 (Core) Full Year*

The IB Diploma Programme language B course provides students with the opportunity to acquire or develop an additional language and to promote an understanding of other cultures through the study of language. The course allows students to access the target language by studying it as a beginner or as someone with prior experience of the language. Language B is designed for students who possess a degree of knowledge and experience in the target language. Programme courses, which are to provide students with:

- a broad and balanced, yet academically demanding, programme of study
- the development of critical-thinking and reflective skills
- the development of research skills
- the development of independent learning skills
- the development of intercultural understanding.

The assessments aim to test all students' ability to understand and use the language of study as well as key concepts through:

- learning a language by engaging with its use and meaning within a social framework
- developing receptive, productive and interactive skills in the language of study.

Students' success in the language B standard level course is measured by combining their grades on external and internal assessment. Curriculum Overview The language B syllabus approaches the learning of language through meaning. Through the study of the core and the options at SL and HL, plus two literary works

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
<b>External</b>			<b>70</b>
<i>Paper 1</i>	Text-handling exercises on four written texts	1.5	25
<i>Paper 2</i>	Written productive skills through one writing exercise	1.5	25
<i>Written assignment</i>	Written exercise and rationale based on intertextual reading		20
<b>Internal</b>			<b>30</b>
<i>Oral work</i>	Individual oral presentation		20
	Interactive oral activities		10

at HL, students build the necessary skills to reach the assessment objectives of the language B course through the expansion of their receptive, productive and interactive skills. SL and HL are differentiated by the recommended number of teaching hours, the depth of syllabus coverage, the study of literature at HL, and the level of difficulty and demands of assessment and assessment criteria.

The core – with topics common to both levels – is divided into three areas and is a required area of study. • Communication and media • Global issues • Social relationships In addition, at both SL and HL, teachers select two from the following five options. • Cultural diversity • Customs and traditions • Health • Leisure • Science and technology Also, at HL, students read two works of literature

Assessment for language B higher level (SENIOR YEAR) The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
<b>External</b>			<b>70</b>
<i>Paper 1</i>	Receptive skills Text-handling exercises on four written texts	1.5	25
<i>Paper 2</i>	Written productive skills through two writing exercises	1.5	25
<i>Written assignment</i>	Receptive and written productive skills Creative writing and rationale based on one literary text read during the course		20
<b>Internal</b>			<b>30</b>
<i>Oral work</i>	Individual oral presentation		20
	Interactive oral activities		10