

**630514 AP CALCULUS BC**

**Full-year course - 5 credits**

**Grade: 12**

**Departmental recommendation: students in this course should have attained a B or better in Honors Pre-Calculus.**

BC Calculus is intended for students who have demonstrated a comprehensive understanding of algebra, geometry, trigonometry and elementary functions (polynomial, rational, trigonometric, exponential and logarithmic functions). It is equivalent to two semesters of college calculus, and designed to prepare students for college courses in multivariable calculus, linear algebra, or differential equations. Accordingly, the course moves at a rapid pace and often requires students to work and learn independently. BC Calculus imparts an understanding of the theory and practice of differentiation and integration, their interconnectedness through the Fundamental Theorem of Calculus, their usefulness to the understanding of infinite series, and their various applications to science, business, medicine, and engineering. The course also values students' ability to communicate clearly, think critically, and apply their knowledge creatively to new and unfamiliar problems. Homework is robust and challenging, and students are encouraged to work in study groups. Assessments are comprehensive. BC Calculus students are expected to complete a Pre-Calculus assignment in the summer, and to take the AP Examination in May.

## TECHNOLOGY CURRICULUM

**689132 THE BEAUTY AND JOY OF COMPUTING**

**Multi-leveled: Standard or Honors**

**Semester Course – 2.5 Credits**

**Grades: 10, 11 & 12**

**Departmental recommendation: Successful completion of Geometry course and enrolled in Algebra II.**

This is an introductory programming course that uses computer languages such as Scheme and Java, along with educational programming environments such as Greenfoot, BlueJ and Snap. No prior programming experience is required. This course focuses on some of the "Big Ideas" of computing such as design, modularization, abstraction, recursion, simulations, and higher-order-functions. Students will work with lists, sorting, searching and other fundamental algorithms of computer science. In addition, the course explores the social dimension our digital world.



**689104 AP - COMPUTER SCIENCE A**

**Full-year course – 5 Credits**

**Grades: 11 & 12**

**Recommended Prerequisite: B or better in Algebra II.**

This course is the equivalent of an introductory college course for students majoring in technical fields such as computer science, math, science, or engineering. Students will spend the majority of their time solving problems by writing, running, and debugging computer programs in the Java programming language. Major topics to be covered include algorithms, data structures, abstraction, and object-oriented programming. Students taking this course are expected to take the AP exam in the spring. It is highly recommended that students have taken either Intro to Programming, received a grade of A- or better in Geometry 630222, or received a grade of B- or better in Geometry 630203.

**642002 BIOLOGY****Full-year course - 5 credits****Grade: 11****Departmental recommendation: Students have a C- or better in Chemistry, or an A in Foundations of Chemistry.**

Biology at the standard level is a laboratory science course designed to provide students with a detailed examination of life science. Students should expect self-directed inquiry learning, but with more teacher direction than the honors level. Students entering this course should be able to apply the physics, chemistry, and mathematics concepts taught in previous years. Topics will include cytology, biochemistry, microbiology, genetics, evolution, botany, human physiology and ecology. Laboratory work includes microscopy, microbiology, biotechnology and bioengineering, field studies and dissection. Students should be sufficiently motivated to complete outside reading and writing requirements.

**642003 HONORS BIOLOGY****Full-year course - 5 credits****Grade: 11****Departmental recommendation: Students have completed Honors Chemistry with a B- or better, or Chemistry with an A- or better.**

Honors Biology is a demanding course requiring higher-reasoning skills used to problem solve and critically analyze problems and data. It is essential that students entering this course can apply the physics, chemistry, and mathematics concepts taught in previous years. Students should also feel comfortable engaging with a challenging text. A deeper coverage of the curriculum material and a vigorous pace is characteristic of honors biology. This course encompasses a detailed examination of biological topics, including cytology, biochemistry, microbiology, genetics, evolution, botany and human physiology. Laboratory work includes microscopy, microbiology, biotechnology and bioengineering, field studies and dissection. Students read and discuss current bioethical issues which include cloning, stem cell research and cancer studies to name a few. Students should be sufficiently motivated to complete outside reading and writing requirements independently.

**SCIENCE ELECTIVES****644122 INTRODUCTION TO ENGINEERING DESIGN****Multi-leveled: Standard or Honors****Semester course - 2.5 credits****Grades: 10, 11, 12****Departmental recommendation: Students have a B or better in current science and math class as sophomores, juniors, or freshmen taking honors courses. Students have an A- or better in current standard freshmen science and math class.**

This standard level class is an engaging course designed for students who are seeking an opportunity to apply their science, technology, and math skills to solve real-world engineering and design challenges. It bridges the gap between theoretical science and practical engineering with an emphasis on research, practical and artistic design, construction, and analysis. Skills developed include: using Solidworks CAD software for design creation, constructing physical prototypes, testing prototypes, and creating how-to guides that clearly communicate the procedures for their creations.

The course is project-based where students will be required to work in small groups. As their contributions will affect the grades of group members, students should be prepared to work effectively and diligently in groups. Students will boost their knowledge of the physical environment while discovering how physics is applied to problem-solving in our rapidly changing high-tech world. As the majority of work is group-based, students should have stronger abilities to self-discipline and stay on task when working independent of direct supervision the earlier they choose to take this course.

**648102 BIOTECHNOLOGY****Full-year course - 5 credits****Multi-leveled: Standard or Honors****Grades: 12****Departmental recommendation: Students selecting the honors level should have a B or better in Honors Biology and or an A- or better in Standard Biology.**

Biotechnology is an elective laboratory course open to seniors who have successfully completed yearlong courses in biology and chemistry. Students will learn biotechnology and microbiology techniques, deepen their understanding of genetics, and learn engineering design concepts as we examine current research in genetic engineering and synthetic biology. Topics covered will include: heredity, molecular genetics, DNA extraction and isolation, cloning, cell culture, gene therapy, DNA forensics, enzyme assays, bacterial transformation, and design of genetic machines. This course may be taken for standard or honors credit.