SCIENCE AND TECHNOLOGY

Science and technology offerings are designed to equip students with scientific understanding of the natural world through knowledge of the basic concepts of science, scientific and technological modes of inquiry, the nature of scientific and technological work and the historical and social contexts of science and technology. Students will understand the basic concepts of the particular discipline they study, will be able to apply them to aspects of their own lives, and will be able to utilize them in combination with skills and knowledge obtained from other fields. The scientific and technological literacy students develop will enable them to make informed decisions in the home, community and workplace.

GRADE	COURSES (3.0 Credits Required)
9 Required	Biology
10 Required	Chemistry
11 Required	Physics (or senior year)
Electives	AP Biology AP Chemistry AP Environmental Studies Anatomy & Physiology Food and Earth Science Marine Biology Our Changing Universe Physics 2 Honors Principles of Engineering 1/11 Science Seminar

BHS Graduation Requirement

The Burlington graduate understands and applies scientific and technological concepts to explain and demonstrate an understanding of the changing world.

To achieve the graduation requirement:

- Students must be able to collect, graph, analyze, and present data.
- Students must be able to communicate scientific concepts in a variety of methods (written, oral, using technology, etc) to diverse audiences.
- Students must be able to develop and test hypotheses.
- Students must perform experiments safely and with awareness of the impact on various environments and others.
- Students must revise and reevaluate their thinking based on evidence.
- Students must be able to identify problems and use the scientific method, data, or research to develop potential solutions and/or draw conclusions.
- Students must examine and critique media (written, audio, video, etc) to evaluation the scientific validity of the information and make unbiased conclusions.

COURSE OFFERINGS

Most BHS students follow *a Biology (9th grade), Chemistry or Earth and Physical Science (10th grade), and Physics (11th grade) lab-science sequence* with an additional science elective in order to prepare for college and careers. BHS offers a variety of other hands-on and applied learning opportunities for students to follow their interests in science. ***Students may double up and take several classes in a year. Students who are in other grades may take courses by permission of the instructor.*** Please look at course prerequisites carefully and consult with school counselors and science teachers for advice and suggestions in selecting science course offerings.

52505 Biology 1 1.0 Credit Grades 9-10
This full-year course focuses on Biology and biological applications and will help to improve the student's science skills, as well as general academic skills. Students will regularly conduct labs, write quarterly lab reports, and complete unit projects. The areas of content covered include biochemistry, cell physiology, genetics, evolution, human body physiology, and environmental science. Successful completion of this course will provide students with the skills needed to take future science courses. *Prerequisite*: Recommendation of 8th grade science teachers; 9th grade or above standing. *Primary Graduate Expectations:* Effective Communication, Creativity and Curiosity, Critical Thinking and Problem Solving.

52506 Biology 1 Honors 1.0 Credit Grades 9-10
This challenging, fast-paced course is for highly motivated students who have grade-level or higher reading, writing, and math skills. Students read biological texts, conduct labs, write quarterly lab reports, complete unit projects, and complete an independent research project. Areas of content covered include biochemistry, cell physiology, genetics, evolution, human body physiology, and environmental science. The course will provide students skills needed to take introductory college-level science courses in the future. Graduate Expectations: Critical Thinking and Problem Solving; Effective Communication. *Prerequisites*: 8th grade science teacher recommendation; successful completion of Algebra 1 or concurrent enrollment in Geometry or Algebra 2. *Primary Graduate Expectations:* Effective Communication, Creativity and Curiosity, Critical Thinking & Problem Solving.

52550 Science Recitation 0.5 Credit Grades 9-10
This science course supports students who are also enrolled in Biology, Earth and Physical Science, and/or Chemistry classes who would benefit from reading text in more detail and support for lab analysis and the writing of lab reports. Students will have the

opportunity to review core concepts and lab skills covered in classes. This class runs for half a block for the school year. Prerequisite: Concurrent enrollment in Biology 1, Earth and Physical Science, and/or Chemistry 1.

52548 Introduction to Chemistry 1.0 Credit Grades 10-12
This supported ELL introduction to science course emphasizes laboratory skills and safety. Basic chemistry concepts and reading about science are included in this language-rich course. *Prerequisite*: Successful completion of ELL Science 2 or equivalent and/or WIDA Level 2-3. *Primary Graduate Expectations:* Effective Communication; Critical Thinking & Problem Solving.

52513 Earth and Physical Science 1.0 credit Grade: 10
This course provides students with scientific literacy in the physical and earth sciences. Topics include introductory physical science concepts, plate tectonics, star formation, and environmental issues. These areas will be explored through inquiry, discussion, projects, lab investigations, research and technology. *Prerequisite*: Successful completion of Biology 1 or by permission of instructor. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication.

52511 Chemistry 1 1.0 Credit Grades 10-11
This college preparatory chemistry class focuses on proficiency in fundamental chemistry concepts and skills. This course includes a mixture of classic laboratory work, guided inquiry, and experimental design. A strong algebra foundation is essential for success as it is applied to many chemistry concepts. Topics studied include: scientific measurement, atomic and molecular structure and theory, nuclear reactions, periodic law, chemical bonding and nomenclature, chemical equations, phases of matter, and chemical reactions**.** *Prerequisite*: Successful completion of Biology I and Algebra I, or recommendation of current science teacher. *Primary Graduate Expectations*: Effective Communication; Creativity & Curiosity; Critical Thinking & Problem Solving.

52512 Chemistry 1 Honors 1.0 Credit Grade 10-11
This college preparatory chemistry class is a rigorous, math-dependent science course. Basic classical concepts are emphasized in class discussions and independent learning. Topics studied include: scientific measurement, atomic and molecular structure/ theory, periodic law, chemical bonding, formulas, equations and stoichiometry, kinetic molecular theory, chemical reactions, acid and bases, and nuclear chemistry. *Prerequisite*: Successful completion of Biology I Honors and concurrent enrollment in or completion of Algebra II, or by recommendation of current science teacher. *Primary Graduate Expectations*: Effective Communication, Creativity & Curiosity; Critical Thinking & Problem Solving.

52549 Introduction to Physics 1.0 Credit Grades 11-12
This supported ELL physics course introduces students to some basic kinematics, Newton's laws, astronomy, waves, optics, and electricity and magnetism. Laboratory skills are developed and students read academic texts for understanding. *Prerequisites*: Successful completion of Intro to Chemistry and/or ELL WIDA Level 4. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication.

52520 Physics 1.0 Credit Grades 11-12
This laboratory-based course utilizes a thematic approach to physics. Units may include the study of mechanics, energy, electrodynamics, optics and sound, and Earth and Space topics. Participation in cooperative groups is an integral part of this course. *Prerequisite***:** Completion of one science credit, or by permission of current science teacher. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication.

52521 Physics 1 1.0 Credit Grades 11-12
This is a college-preparatory laboratory oriented physics course designed for students with strong reading, problem solving and computation skills. Topics in physics include mechanics, Newton's Laws, energy, electrodynamics, optics and sound. Topics are covered using mathematical relationships. *Prerequisites*: Completion of Biology and Chemistry, Algebra I and Geometry, or permission of current science teacher. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication.

52522 Physics 1 Honors 1.0 Credit Grades 11-12
This math and laboratory-based course is designed for students with very strong reading, problem solving, and mathematics skills. Students work independently and in collaborative groups to discover important concepts in the study of mechanics, Newton's Laws, energy, astronomy, electrodynamics, optics and sound. *Prerequisite*: Concurrent enrollment in or completion of Pre-Calculus, or by permission of current science teacher. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication.

Electives

52525 AP Biology and Recitation 1.5 Credits Grades 11-12
Advanced Placement Biology is an advanced, honors level biology program, which emphasizes molecular and cellular biology, genetics, evolution, and organisms and populations. Students should also have a strong background in mathematics and should be proficient in the use of basic laboratory equipment and be familiar with laboratory safety procedures. Students in the course will take the Advanced Placement Examination in Biology given in May of each year. Prerequisites: Successful completion of

Biology I and Chemistry I (Meets for 1.5 Blocks). *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication.

52526 AP Chemistry and Recitation 1.5 Credits Grades 11-12
This is a challenging, mathematical, laboratory-oriented chemistry course designed for those students with interest in expanding their chemistry knowledge. Topics include extensions of ideas learned in Chemistry I, inorganic chemistry, introductory to organic chemicals, analytical methods, thermochemistry, and chemical kinetics and equilibrium. Students will take the AP Chemistry Exam in May. *Prerequisite***:** Successful completion of Algebra II & Chemistry I or Chemistry I Honors* (Meets for 1.5 Blocks). *Primary Graduate Expectations*: Effective Communication, Creativity and Curiosity; Critical Thinking & Problem Solving.

52554 AP Environmental Science 1.0 Credit Grade 11-12
Students will study the interrelated parts and connections between earth systems and human impact upon them through laboratory exercises, modeling, debate and independent research. National and local environmental policy, planning, and impact are also explored in depth. Students will study these and other topics thoroughly in order to prepare for the Advanced Placement exam in May. *Prerequisites*: Successful completion of Algebra II & Chemistry I or Chemistry I Honors. *Primary Graduate Expectations*: Effective Communication, Creativity and Curiosity; Critical Thinking & Problem Solving.

52552 Food and Earth Science 1.0 Credit Grades 10-12
This course is divided into two main topics: food science and earth science. *Food science,* which runs first semester, is a 'test kitchen' where we learn the science behind cooking food and conduct experiments to analyze the role ingredients have in a recipe in the attempt to cook the best cookies, tortillas, cakes, meats, etc. We study the science behind making salsa, jam, bread, yogurt and cider to name a few examples. We also maintain and harvest the school gardens while contributing a few food items for the school lunches. *Earth science* is covered second semester. Topics include studying the sun, our atmosphere, the solar system, plate tectonics, volcanoes, earthquakes, weather, climate changes and tapping maple trees to get the best maple syrup this side of the Pacific Ocean. *Prerequisite*: 10^{th}-11^{th} graders should be concurrently enrolled in Chemistry or Physics. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication.

52533 Human Anatomy and Physiology 1.0 Credit Grades 11-12
Human Anatomy and Physiology is a challenging year-long course that encompasses the parts of the body and how they work. This course is designed for students who wish to learn how their bodies work or are interested in pursuing careers in the health field after graduation. Topics studied will include the following systems: integumentary (skin), skeletal, muscular, digestive, nervous, cardiovascular, endocrine, and reproductive. Four optional dissections aid in our discovery of the human body. *Prerequisites*: Senior standing with successful completion of a biology course and/or concurrent enrollment in Physics, or by permission of current science teacher. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication.

52551 Marine Biology and Oceanography 1.0 Credit Grades 10-12
This course aims to provide students with an appreciation and basic working knowledge of our oceans and marine life. The course will focus on both the living and nonliving components in our oceans that contribute to the diverse ecosystems and abundant resources under the sea! In addition to natural ocean phenomenon such as currents, waves, plate tectonics, island formation, species diversity and weather, human impacts like pollution, over exploitation of fishing /whaling practices, climate change, and possible career fields will be studied. Demonstrations, labs, videos, and group projects will enhance learning from classroom lectures, articles, and group discussions. *Prerequisite*: 10^{th}-11^{th} graders should be concurrently enrolled in Chemistry or Physics. *Primary Graduate Expectations*: Critical Thinking and Problem Solving; Effective Communication.

52555 Our Changing Universe 1.0 Credit Grades 10-12
"There is nothing permanent except change," said Heraclitus in Plato's *Cratylus*. More than two millennia later, modern science has revealed to us just how right Heraclitus was. This interdisciplinary course uses the major discoveries of life and physical science to explore the big idea of change over time. Topics will include evolution, plate tectonics, climate change, the Big Bang, and others. Additionally, students will develop the skills to independently gather and analyze complex information, then present it to an audience. *Prerequisite*: Successful completion of one science class with concurrent enrollment in Chemistry or by recommendation of science teacher. *Primary Graduate Expectations*: Creativity & Curiosity; Effective Communication.

52531 Physics 2 Honors 1.0 Credit Grade 12
This is an in-depth project-based course focusing on applications of physics in a range of disciplines. Physics II is designed for students with proficient math skills. Areas of study may include projectiles (including drag effects), rotational motion, fluid dynamics, hydraulics, thermodynamics, rocketry, and electricity and magnetism. The course emphasizes real-life applications of physics concepts. Students will learn to use computer spread sheets to model complex phenomena. *Prerequisites*: Senior standing with successful completion of Physics I or Honors Physics I. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication.

52540 Principles of Engineering I 0.5 Credit Grades 9-12
In this semester course, students will explore the four areas of technology education; communications, construction, manufacturing, and transportation and power technologies. During this activity-driven course, students will use the engineering design cycle to create solutions to a variety of STEAM assignments. All design challenges will help develop the students' ability

to analyze, use logical reasoning, and problem solve. Concepts of power, force, velocity, acceleration, and speed will be covered. Recent class projects have included building rockets, catapults, aerodynamic dragsters, simple machines and balsa bridges and creating promotional graphics, claymation videos. Class will involve note taking, researching, quizzes and tests, but will focus heavily on hands-on projects with a strong emphasis of the importance of safety in the shop. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication; Curiosity & Creativity.

52541 Principles of Engineering II **1. 0 Credit** **Grades 10-12**
Students will continue to investigate the four areas of technology education with a more in-depth physics emphasis. Students will research, design, and construct projects such as Recent design challenges have included constructing parachutes, planes, maglev vehicles, electric terrain vehicles, boats, cutting boards, wooden pens and designing single color screen printing, promotional brochures, architectural layouts, and exploring alternative energy sources (wind, solar, hydro). Class will involve note taking, research, quizzes and tests, but will focus heavily on hands-on projects. *Advanced Principles of Engineering II is for highly motivated students who are ready and willing to work at a faster pace. Prerequisite*: C or higher in Principles of Engineering. This course is eligible for 1.0 Science credit. *Primary Graduate Expectations*: Critical Thinking & Problem Solving; Effective Communication; Curiosity & Creativity.

52501 Science Seminar **1.0 Credit** **Grades 10-12**
This year-long class will provide students the opportunity to independently explore personal interests and how those interests connect to science and the broader world. Students will develop an individual research question or project with the guidance of a teacher advisor. A student's research could include, but is not limited to, branches of science not offered at BHS such as geology or neurobiology as well as more specific science topics. Some topics from previous classes include the physiological and emotional effects of starvation, creating a geological database, bioremediation, and the effects of stress on the teenage body. This class does require students to make a connection with community partners to expand their learning and understanding. Students will demonstrate their learning each quarter by presenting their work, data, and next steps with their project to a small group of invited teachers, advisors, peers, parent/guardians, administrators, and friends. *Prerequisites*: Student must be in grades 10-12. 10th grade students must have successfully completed Biology and are concurrently enrolled in Chemistry. *Primary Graduate Expectations*: Effective Communication; Critical Thinking and Problem Solving; Personal Development; Creativity and Curiosity.