

# SCIENCE

## Introduction:

New York State has adopted the Next Generation Science Standards (NGSS), referred to as the New York State Science Learning Standards (NYSSLS). The adoption of these new standards has not changed what we teach but how we teach. Today's science classes look very different from science classes historically. While teacher directed instruction is still critical, students will be expected to participate in hands-on, discovery-based learning that will require them to work through unfamiliar scenarios, ask questions, construct explanations, plan and carry out investigations, collect data, make claims supported by evidence, engage in scientific argumentation, model complex systems, identify patterns, determine cause and effect, and describe phenomena. Students will be responsible for their learning. Teachers are responsible for setting up the environment that will allow them to learn successfully. **Our most important job is to switch from teaching students to learn what scientists know and move toward teaching students to do what scientists do. This is the most common request from science professionals and professors!**

Failure is part of the NGSS; not failure in terms of grades, though this may occur, but more importantly, the willingness to try something that may or may not work, analyze the results and try again. Students and parents are extremely uncomfortable with this. Your support in encouraging our young people to try without an initial guarantee of success is paramount to creating an atmosphere for REAL science learning.

**Typical Science Sequence for a Students at North High School**

9th grade	10th grade	11th grade	12th grade
Physics 9	- Living Environment 10 - Regents Chemistry - Honors Chemistry	- Regents Biology - Honors Biology - AP Biology - Science Elective	- Science Elective - Regents Physics - AP Courses
Physics Honors 9	- Regents Chemistry - Honors Chemistry - AP Chemistry	- Regents Biology - Honors Biology - AP Biology	- Science Electives - AP Courses
AP Physics 1	- Regents Chemistry - Honors Chemistry - AP Chemistry	- Regents Biology - Honors Biology - AP Biology	- Science Electives - AP Courses

## Student Course Placement:

Students are placed into science courses each year based upon a number of factors; the ultimate placement is a result of their science teacher's recommendation. Grades in the child's current science courses are certainly considered, as they have consistently been shown to be a good indicator of success. Grades in other relevant courses, especially math, are also considered. Grades are not the only indicator of success; student behaviors like note taking, attending extra help, and appropriate engagement in the classroom and laboratory setting, willingness to try new things, and to struggle with

challenging topics also contribute to the teacher's recommendation for courses. Please contact your child's teacher if you wish to discuss your child's recommendation.

**Self Select:** Junior and Seniors students who are not recommended to take an Advanced Placement (AP) course are permitted to self select into **one** course total per year. Should you and your child decide to take this route, your child must:

1. Obtain a form from the guidance counselor that you, your child, your child's counselor, and the science department head will sign.
2. Meet with the department chair to discuss the choice
3. Submit a completed self select form to guidance

\*\*\* Please be aware that any student who needs to change courses after the beginning of the year may be required to change their schedule, often significantly; this can include both a change in periods and a change in teacher(s). This possibility should be weighed in the decision to self select into any course. Due to limits on class size, a student dropping from an AP Course is not guaranteed a placement in an Honors course.

#### **Meetings Per Cycle:**

- All science laboratory classes in Physics, Chemistry, and Biology meet every day for one period and have an additional laboratory period every other day. For example, your child may meet every day period 3 for science and every other day period 4 for laboratory.
- Science Electives meet 1 period/day.

## **NINTH GRADE**

### **Physics 9:**

Who Should Take Physics 9?

Almost all ninth grade students are expected to enroll in Physics 9. Exceptions are those students who are recommended by North Middle School to enroll in Physics Regents or AP Physics 1.

What Will We Be Studying In Physics 9?

Physics 9 will follow an algebra-based physics curriculum appropriate for high school freshmen. This course covers many of the traditional areas of a first course in Physics, with sections on: motion, forces, momentum and impulse, energy, and electricity. Alongside the theoretical section of the course, there will be a strong practical aspect as well. Experimentation is a major part of the subject and will occur throughout the course. There is also an emphasis on improving number sense, a skill that is critical to success in all science classes.

What Will Be Expected Of Me?

Students will be expected to engage in a variety of learning experiences. Teacher directed instruction, engineering challenges, creation and execution of laboratory activities, various levels of group work, and discovery based learning are the norm. The course is investigative in nature and students are often expected to work in groups to create a single product. Students will also be expected to take notes and participate in class discussions. Students are required to have a non-graphing scientific calculator, a ruler, and a protractor with them every day in addition to a fully charged iPad and other required

materials. Students should expect to study and practice outside of class every day and to attend extra help if they are struggling.

#### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on problem solving with the teacher in class. Students will also be required to complete a quarterly engineering project.

#### What Are The Completion Requirements?

Students will be required to take the school-based exit exam in June.

1 unit of credit: Prerequisites: Either Earth Science or Science 8

#### **NEW COURSE DESCRIPTION - Physics Honors 9:**

##### Who Should Take Physics Honors 9?

Any 8th grader with strong algebra skills and strong problem solving skills. Students in this class will also need to learn some trigonometry associated with the physics regents curriculum. Students will be recommended by North Middle School for this class. Recommendations are based on a variety of factors, including math and science grades, student behaviors, and teacher recommendations.

##### What Will We Be Studying In Physics Honors 9?

Physics Honors 9 follows a course of study that is built upon the NYS Physics curriculum. This syllabus includes: introduction and math review, kinematics, dynamics, circular motion & gravity, momentum, work and energy, waves, electricity and magnetism, and modern physics.

##### What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and work challenging mathematical problems in physics. This course requires independent thinking, problem solving, and engineering and a willingness to try things that you are unfamiliar with. Students will need a non-graphing scientific calculator and a fully charged iPad as well as other classroom necessities. Students will be expected to take the NYS Physics Regents Exam or equivalent and complete a minimum of 1200 minutes of graded lab work. Students should expect to study and practice outside of class every day.

#### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the

content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

### What Are The Completion Requirements?

Students will be required to take the NYS Regents Physics Examination or equivalent in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit: Prerequisite: Recommendation from North Middle School

### **Advanced Placement Physics 1:**

#### Who Should Take Advanced Placement Physics 1?

Any student who has successfully completed Honors or AP Chemistry and performed at the top of their class in Advanced Placement Biology will be recommended for Advanced Placement Physics 1. 8th grade students with exceptional scores in Algebra and Earth Science may also be recommended by North Middle School. Strong algebra and trigonometry skills are needed. Students may self-select for this course if they are going to be juniors or seniors. Please see the section on self selection at the beginning of the science course catalog for more information about this process. Please note that this course is a mixed grade level course and can contain students from 9th through 12th grade.

#### What Will We Be Studying In Advanced Placement Physics 1?

This course follows the Advanced Placement Physics 1 syllabus and is equivalent to a first year college course in algebra-based physics. Topics include kinematics, dynamics, circular motion and gravitation, energy, momentum, simple harmonic motion, torque and rotational motion, mechanical waves and sound, electric, charge and electric force, and DC circuits.

#### What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and work challenging mathematical problems in physics. This course requires independent thinking, problem solving, and engineering and a willingness to try things that you are unfamiliar with.

Students will need a calculator and a fully charged iPad as well as other classroom necessities. Students should expect to study and practice extensively outside of class every day.

#### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

What Are The Completion Requirements?

Students will be required to prepare for and take the Advanced Placement examination in Physics 1 in May, and might also take the NYS Physics Regents examination in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit: Prerequisite: Physics 9, Chemistry, Biology, Algebra II/Trigonometry or equivalent, and Department recommendation.

## **TENTH GRADE**

### **Living Environment 10**

Who Should Take Living Environment 10?

Any student who needs additional support in science after 9th grade will be recommended for Living Environment 10.

What Will We Be Studying In Living Environment 10?

Living Environment 10 strictly follows a course of study that is in alignment with the NYS Living Environment curriculum.

What Will Be Expected Of Me?

Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations, and do hands-on discovery learning activities. Students will need a four function calculator and a fully charged iPad as well as other classroom necessities outlined by the teacher. Students will be expected to take the NYS Living Environment Regents Exam and complete a minimum of 1200 minutes of graded lab work; including four specified NYS lab activities. Students who do not meet the laboratory requirements will not be eligible to sit for the regents exam. Students should expect to study and practice outside of class every day.

How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

What Are The Completion Requirements?

Students will be required to take the NYS Regents examination in Biology in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit: Prerequisite: Physics-9

### **Regents Chemistry:**

Who Should Take Regents Chemistry?

Any student who has successfully completed Physics 9 will be recommended for Chemistry Regents.

What Will We Be Studying In Regents Chemistry?

Regents Chemistry follows a course of study prescribed by the NYS Board of Regents. Topics covered include: matter and energy, atomic structure, bonding, the periodic table, stoichiometry, kinetics and equilibrium, acids and bases, oxidation-reduction reactions and electrochemistry, organic chemistry, and nuclear chemistry.

What Will Be Expected Of Me?

Students will be expected to engage in a variety of learning experiences. Teacher directed instruction, engineering challenges, creation and execution of laboratory activities, various levels of group work, and discovery based learning are the norm. The course is investigative in nature and students are often expected to work in groups. Students will also be expected to take notes and participate in class discussions. Students will need a non-graphing scientific calculator and a fully charged iPad as well as other classroom necessities. Students should expect to study and practice outside of class every day.

How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on problem solving with the teacher in class.

What Are The Completion Requirements?

Students will be required to take the NYS Regents examination in Chemistry in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit Prerequisite: Physics 9, Physics 9 honors, or recommendation by a guidance counselor for new incoming students.

## **Honors Chemistry:**

### Who Should Take Honors Chemistry?

Any student who has successfully completed Physics 9 Honors will be recommended for Honors Chemistry. In some cases, students who have shown exemplary performance in Physics 9 will be recommended for Honors Chemistry.

### What Will We Be Studying In Honors Chemistry?

Honors Chemistry follows a course of study prescribed by the NYS Board of Regents, but the depth of study is in alignment with the SAT II Subject Test in Chemistry. Topics covered include: matter and energy, atomic structure, bonding, the periodic table, complex stoichiometry, kinetics and equilibrium, acids and bases, oxidation-reduction reactions and electrochemistry, organic chemistry, and nuclear chemistry. Please note that this course is a math heavy course and a strong understanding of proportional relationships and algebraic principles is necessary for success.

### What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and work challenging mathematical problems in chemistry. This course requires independent thinking, problem solving, and engineering and a willingness to try things that you are unfamiliar with. Students will need a non-graphing scientific calculator and a fully charged iPad as well as other classroom necessities. Students will be expected to take the NYS Chemistry Regents Exam, complete a minimum of 1200 minutes of graded lab work. Students should expect to study and practice outside of class every day.

### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on problem solving with the teacher in class.

### What Are The Completion Requirements?

Students will be required to take the NYS Regents Examination in Chemistry in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit Prerequisite: Physics 9 Honors or Physics 9 and a recommendation from the student's 9<sup>th</sup> grade teacher

## **ELEVENTH & TWELFTH GRADES**

### **Regents Biology:**

Who Should Take Regents Biology?

Any student who has successfully completed Regents Chemistry will be recommended for Regents Biology.

What Will We Be Studying In Regents Biology?

Regents Biology follows a course of study that is built upon the NYS Living Environment curriculum. In addition to this syllabus the course involves biochemistry, molecular biology, and the anatomy and physiology of living organisms.

What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and synthesize new ideas from prior knowledge. This course requires independent thinking, problem solving, and engineering and a willingness to try things that you are unfamiliar with. Students will need a four-function calculator and a fully charged iPad as well as other classroom necessities. Students will be expected to take the NYS Living Environment Regents Exam, complete a minimum of 1200 minutes of graded lab work. Students should expect to study and practice outside of class every day.

How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

What Are The Completion Requirements?

Students will be required to take the NYS Regents examination in Biology in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit: Prerequisite: Physics-9 and Regents Chemistry or Physics 9 and Living Environment 10.



## **Honors Biology:**

### Who Should Take Honors Biology?

Any student who has completed Honors Chemistry with strong marks and strong student behaviors can be recommended for Honors Biology. Students who have shown exemplary performance in Chemistry Regents can also be recommended for Honors Biology.

### What Will We Be Studying In Honors Biology?

Honors Biology follows a course of study that is built upon the NYS Living Environment curriculum. In addition to this syllabus the course involves biochemistry, molecular biology, and the anatomy and physiology of living organisms. The level of instruction will match that of the former SAT II Biology curriculum.

### What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and synthesize new ideas from prior knowledge. This course focuses much more heavily on molecular chemistry and genetics, and requires that students understand complex chemical interaction in order to be successful. This course requires independent thinking, problem solving, and engineering and a willingness to try things that you are unfamiliar with. Students will need a four-function calculator and a fully charged iPad as well as other classroom necessities. Students will be expected to take the NYS Living Environment Regents Exam, complete a minimum of 1200 minutes of graded lab work. Students should expect to study and practice outside of class every day.

### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

### What Are The Completion Requirements?

Students will be required to take the NYS Regents examination in Biology in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit: Prerequisite: Physics-9 and Regents Chemistry with a teacher recommendation or Physics-9 and Honors Chemistry

## **Advanced Placement Biology:**

### Who Should Take Advanced Placement Biology?

Any student who has completed Honors Chemistry with high marks and strong student behaviors will be recommended for Advanced Placement Biology. In some cases, students who have shown exemplary performance in Chemistry Regents will be recommended for Advanced Placement Biology. Students may self-select for this course. Please see the section on self selection at the beginning of the science course catalog for more information about this process.

### What Will We Be Studying In Advanced Placement Biology?

The Advanced Placement Biology course is a two semester college level course designed for students who have a firm mastery of the concepts in high school science and who have demonstrated ability in critical thinking and in mathematical and laboratory skills. Topics studied include biological chemistry, cells, energy transformations, molecular genetics, and ecology. Laboratory work is experimental and quantitative, rather than descriptive. This course is both content and vocabulary heavy and students are expected to evaluate and respond to novel information that will not specifically be taught in class. Scientific application is a main focus of this course.

### What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and work challenging mathematical problems in biology. This course requires independent thinking, problem solving, and engineering and a willingness to try things that you are unfamiliar with. Students will need a non-graphing scientific calculator and a fully charged iPad as well as other classroom necessities. Students will be expected to take the NYS Biology Regents Exam, complete a minimum of 1200 minutes of graded lab work. Students should expect to study and practice extensively outside of class every day.

### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class. The weeks following the AP exam will be devoted to the completion of individual extended projects and the completion of the 4 required NYS labs for Living Environment.

### What Are The Completion Requirements?

Students will be required to prepare for and take the Advanced Placement examination in Biology in May and the Biology Regents in June, if not previously completed. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit: Prerequisites: Physics, Chemistry, and Department recommendation.

## **Regents Physics:**

Who Should Take Regents Physics?

Any student who has successfully completed Regents Biology can be recommended for Regents Physics. 8th grade students who are recommended by North Middle School may also enroll in the course. Please note that this course is a mixed grade level course and can contain students from 9th through 12th grade.

What Will We Be Studying In Regents Physics?

Regents Physics follows a course of study that is built upon the NYS Physics curriculum. This syllabus includes: introduction and math review, kinematics, dynamics, circular motion & gravity, momentum, work and energy, waves, electricity and magnetism, and modern physics.

What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and work challenging mathematical problems in physics. This course requires independent thinking, problem solving, and engineering and a willingness to try things that you are unfamiliar with. Students will need a non-graphing scientific calculator and a fully charged iPad as well as other classroom necessities. Students will be expected to take the NYS Physics Regents Exam or equivalent and complete a minimum of 1200 minutes of graded lab work. Students should expect to study and practice outside of class every day.

How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

What Are The Completion Requirements?

Students will be required to take the NYS Regents Physics Examination or equivalent in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit: Prerequisite: Physics 9, Regents Chemistry and Regents Biology

## **Advanced Placement Physics 1:**

Who Should Take Advanced Placement Physics 1?

Any student who has successfully completed Honors or AP Chemistry and performed at the top of their class in Advanced Placement Biology will be recommended for Advanced Placement Physics 1. 8th grade students with exceptional scores in Algebra and Earth Science may also be recommended by North

Middle School. Strong algebra and trigonometry skills are needed. Students may self-select for this course if they are going to be juniors or seniors. Please see the section on self selection at the beginning of the science course catalog for more information about this process. Please note that this course is a mixed grade level course and can contain students from 9th through 12th grade.

#### What Will We Be Studying In Advanced Placement Physics 1?

This course follows the Advanced Placement Physics 1 syllabus and is equivalent to a first year college course in algebra-based physics. Topics include kinematics, dynamics, circular motion and gravitation, energy, momentum, simple harmonic motion, torque and rotational motion, mechanical waves and sound, electric, charge and electric force, and DC circuits.

#### What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and work challenging mathematical problems in physics. This course requires independent thinking, problem solving, and engineering and a willingness to try things that you are unfamiliar with.

Students will need a calculator and a fully charged iPad as well as other classroom necessities. Students should expect to study and practice extensively outside of class every day.

#### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

#### What Are The Completion Requirements?

Students will be required to prepare for and take the Advanced Placement examination in Physics 1 in May, and might also take the NYS Physics Regents examination in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit: Prerequisite: Physics 9, Chemistry, Biology, Algebra II/Trigonometry or equivalent, and Department recommendation.

#### **Advanced Placement Physics C**

#### Who Should Take Advanced Placement Physics C?

Any student who has successfully completed Physics Honors 9, Honors or AP Chemistry and performed at the top of their class in Advanced Placement Biology can be recommended for Advanced Placement Physics C. Students will also need to be concurrently enrolled in Calculus, preferably BC Calculus.

Students may self-select for this course. Please see the section on self selection at the beginning of the science course catalog for more information about this process.

#### What Will We Be Studying In Advanced Placement Physics C?

This course follows the Advanced Placement Physics C syllabus and is equivalent to a first year college course in calculus based physics. There are two AP Exams at the end of the course. Topics include kinematics; Newton's laws of motion; work, energy, and power; systems of particles and linear momentum; rotation; oscillations; gravitation; electrostatics; conductors, capacitors, dielectrics; electric circuits; magnetic fields; electromagnetism.

#### What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and work challenging mathematical problems in physics using algebra, trigonometry, and calculus. This course requires independent thinking, problem solving, and engineering and a willingness to try things that you are unfamiliar with. Students will need a calculator and a fully charged iPad as well as other classroom necessities. Students should expect to study and practice extensively outside of class every day.

#### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

#### What Are The Completion Requirements?

Students will be required to prepare for and take the Advanced Placement examinations in Mechanics and Electricity and Magnetism in May. Please note there are two separate AP exams that are completed at the end of this course.

1 unit of credit: Prerequisites: Honors or AP Biology, Honors or AP Chemistry, AP Calculus (concurrent enrollment), and Department recommendation.

### **Advanced Placement Chemistry**

#### Who Should Take Advanced Placement Chemistry?

Any student who has successfully completed Chemistry and performed at the top of their class in Advanced Placement Biology will be recommended for Advanced Placement Chemistry as a senior. Students enrolled in Physics Honors 9 may also be recommended for Advanced Placement Chemistry if they are performing at the very top of their class. Students may self-select for this course. Please see the section on self selection at the beginning of the science course catalog for more information about this process.

## What Will We Be Studying In Advanced Placement Chemistry?

The Advanced Placement Chemistry course is a two semester college level course designed for students who have a firm mastery of the concepts in high school science and who have demonstrated ability in critical thinking and in mathematical and laboratory skills. Topics studied include: atomic structure and properties, molecular and ionic compound structure and properties, intermolecular forces and properties, chemical reactions, kinetics, thermodynamics, equilibrium, acids and bases, and applications of thermodynamics

## What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and work challenging mathematical problems in chemistry using algebra. This course requires independent thinking, problem solving, and a willingness to try things that you are unfamiliar with. Students will need a calculator and a fully charged iPad as well as other classroom necessities. Students should expect to study and practice extensively outside of class every day.

## How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class. The weeks following the AP exam will be devoted to the completion of individual extended projects.

## What Are The Completion Requirements?

Students will be required to prepare for and take the Advanced Placement examination in Chemistry in May and underclassmen will also take the Chemistry Regents in June. Students must complete 1200 minutes of laboratory work, which must be submitted, graded, recorded, and stored at school in order to sit for the Regents examination.

1 unit of credit: Prerequisites: For seniors - Physics 9, Chemistry, AP Biology, and Department recommendation. For sophomores - Physics Honors 9 and Departmental recommendation.

## **Advanced Placement Environmental Science**

### Who Should Take Advanced Placement Environmental Science?

Any student who has successfully completed biology regents and chemistry regents with strong grades may take this course. Students may self-select for this course. Please see the section on self selection at the beginning of the science course catalog for more information about this process.

### What Will We Be Studying In A.P. Environmental Science?

The course is designed to be the equivalent of a one-semester, introductory college course in environmental science. Topics studied include environmental issues, aquatic and terrestrial ecosystems, ecology, weather and climate, population dynamics, geology and geological processes, and pollution. Laboratory work is in the form of field studies and other experimental and analytical studies. Assigned readings include current articles and excerpts from books.

#### What Will Be Expected Of Me?

You will be expected to regularly take part in challenging problem solving experiences. Students will be required to work in groups to explore and explain novel phenomena, perform lab investigations which are often self-created, and work challenging mathematical problems in chemistry using algebra. This course requires independent thinking, problem solving, and a willingness to try things that you are unfamiliar with. Students will need a calculator and a fully charged iPad as well as other classroom necessities. Students should expect to study and practice outside of class every day.

#### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class. The weeks following the AP exam will be devoted to the completion of individual extended projects which are a requirement for course completion.

#### What Are The Completion Requirements?

Students will be required to prepare for and take the Advanced Placement examination in Environmental Science in May.

1 unit of credit: Prerequisites: Physics 9, Regents Chemistry and Regents Biology, and Department recommendation.

### **ELECTIVES**

\*\*\*NOTE - Students who have enrolled in an AP course as a senior and who have shown strong science and math skills throughout their high school career may concurrently enroll in an additional science elective, space permitting, with the permission of their guidance counselor and the science department chairperson. Not all elective courses are offered every year. Please speak with your guidance counselor about the offerings that are available to you.

#### **Human Anatomy and Physiology**

Who Should Take Human Anatomy and Physiology?

Any student who has completed Regents Chemistry/Regents Biology can be recommended for this course. Special recommendations can be made through guidance with the permission of the science department chairperson.

#### What Will We Be Studying In Human Anatomy and Physiology?

This is a single period, elective course. This course provides a detailed study of the anatomy and physiology of human organ systems as well as the impacts of disease on these systems. Students will learn about how life choices and environmental aspects can affect the health of these systems.

#### What Will Be Expected Of Me?

Students will be expected to engage in a variety of learning experiences. Teacher directed instruction, creation and execution of laboratory activities, various levels of group work, projects and presentations, and discovery based learning are the norm. The course is investigative in nature and students are often expected to work in groups. Students will also be expected to take notes and participate in class discussions. Students may be required to read and report on current events pertaining to class material. Students are required to have a fully charged iPad and other required materials. Students should expect to prepare for class every day.

#### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

#### What Are The Completion Requirements?

Students must successfully complete the required coursework for Human Anatomy and Physiology.

1 unit of credit: Prerequisite: Physics, Chemistry, and Biology or a special recommendation through guidance with departmental approval.

### **Astronomy**

#### Who Should Take Human Astronomy?

Any student who has completed Regents Chemistry/Regents Biology can be recommended for this course. Special recommendations can be made through guidance with the permission of the science department chairperson.

#### What Will We Be Studying In Astronomy?

This is a single period, elective course. This course provides an introduction to the study of the physical principles involved in Astronomy. The class includes investigation of the universe as a whole, our solar system, other galaxies and cosmology, and stars and stellar evolution.



## What Will Be Expected Of Me?

Students will be expected to engage in a variety of learning experiences. Teacher directed instruction, creation and execution of laboratory activities, various levels of group work, projects and presentations, and discovery based learning are the norm. The course is investigative in nature and students are often expected to work in groups. Students will also be expected to take notes and participate in class discussions. Students may be required to read and report on current events pertaining to class material. Students are required to have a fully charged iPad and other required materials. Students should expect to prepare for class every day.

## How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

## What Are The Completion Requirements?

Students must successfully complete the required coursework for Astronomy.

1 unit of credit: Prerequisite: Physics, Chemistry, and Biology. Special recommendations can be made through guidance with the permission of the science department chairperson.

## **Human Impact and Environmental Relationships**

### Who Should Take Human Impact and Environmental Relationships?

Any student who has completed Regents Chemistry/Regents Biology can be recommended for this course. Special recommendations can be made through guidance with the permission of the science department chairperson.

### What Will We Be Studying In Human Impact and Environmental Relationships?

This is a single period, elective course. The curriculum is structured around learning relevant environmental studies as well as the effects of humans on changes in the environment. Environmental justice, ecology, ecosystems, global climate and biomes, biodiversity, population dynamics, systems and resource use, consumption, pollution, climate change, and sustainability will all be covered.

## What Will Be Expected Of Me?

Students will be expected to engage in a variety of learning experiences. Teacher directed instruction, creation and execution of laboratory activities, various levels of group work, projects and presentations, and discovery based learning are the norm. The course is investigative in nature and students are often expected to work in groups. Students will also be expected to take notes and participate in class

discussions. Students may be required to read and report on current events pertaining to class material. Students are required to have a fully charged iPad and other required materials. Students should expect to prepare for class every day.

#### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

#### What Are The Completion Requirements?

Students must successfully complete the required coursework for Human Impact and Environmental Relationships.

1 unit of credit: Prerequisite: Physics, Chemistry, and Biology. Special recommendation can be requested through guidance with the approval of the science department chairperson.

### **Forensic Science**

#### Who Should Take Forensic Science?

Any student who has completed Chemistry and Biology can be recommended for this course. Special recommendations can be made through guidance with the permission of the science department chairperson.

#### What Will We Be Studying In Forensic Science?

This is a single period elective course. Forensic science is an investigatory course in which students will apply their prior knowledge of biology, chemistry, physics and mathematics to the popular field of crime scene investigation. Students will use an inquiry-based approach to learn about the tools and techniques used by forensic scientists in solving crimes. Students will learn terminology and investigate procedures related to crime scene, questioning, interviewing, criminal behavior characteristics, truth detection, and scientific procedures. Using scientific methods, students will collect and analyze evidence through case studies and simulated crime scenes such as fingerprint analysis, ballistics, and blood spatter analysis. The course will use an NGSS-based approach to evidence collection, claim formation, data analysis, and argumentation. Students will also learn about the history, legal aspects, and career options for forensic science.

#### What Will Be Expected Of Me?

Students will be expected to engage in a variety of learning experiences. Teacher directed instruction, creation and execution of laboratory activities, various levels of group work, projects and presentations, and discovery based learning are the norm. The course is investigative in nature and students are often expected to work in groups. Students will also be expected to take notes and participate in class discussions. Students may be required to read and report on current events pertaining to class material.

Students are required to have a fully charged iPad and other required materials. Students should expect to prepare for class every day.

#### How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

#### What Are The Completion Requirements?

Students must successfully complete the required coursework for Forensic Science.

1 unit of credit: Prerequisite: Physics, Chemistry, and Biology. Special recommendation can be requested through guidance with the permission of the science department chairperson.

### **Science in Our World I and II**

#### Who Should Take Science in Our World I and II?

Any student who has completed Living Environment 10/Regents Biology can be recommended for this course.

#### What Will We Be Studying In Science in Our World I and II?

This is a non-laboratory elective course which deals with issues of current concern to society. Topics discussed in class are based on student interest as well as current issues. While there are prepared topics to share with students, students are also encouraged to bring articles and other materials to support and guide the discussion. This course is an extension of current events and a good deal of the activities in this class will be based on current issues that are impacting our society. Please note that topics taught in Science in Our World I differ from those in Science in Our World II and therefore a student can take these classes in consecutive years without repeating material.

#### What Will Be Expected Of Me?

Students will be expected to engage in a variety of learning experiences. Teacher directed instruction, engineering challenges, creation and execution of laboratory activities, various levels of group work, and discovery based learning are the norm. The course is investigative in nature and students are often expected to work in groups. Students will also be expected to take notes and participate in class discussions. Students will also be required to read and report on current events pertaining to class material. Students are required to have a fully charged iPad and other required materials. Students should expect to prepare for class every day.

## How Is The Course Taught?

A variety of methods will be employed, including direct instruction, the use of demonstrations, model making, videos, graphical analysis, investigations, and a great deal of hands-on laboratory and group work. Students will also participate in flipped classroom activities which move the introduction of the content to structured videos, watched outside of class, leaving room for hands-on activities and modeling with the teacher in class.

## What Are The Completion Requirements?

Students must successfully complete the required coursework for Science in Our World I and II.

1 unit of credit: Prerequisite: Living Environment10/Biology Regents and Department recommendation.

## **Research 9**

### Who Should Take Research 9?

Students who have strong student skills, good time management, are self-motivated, and are strong in both math and science should consider this *additional* elective course. Students must apply while at North Middle School and will be accepted by the North High School Department Chair and the North High School Science Research Director. 9th graders who are new to the district can reach out to the science department head or the director of science research to discuss enrollment in this course.

### What Will We Be Studying In Research 9?

Research 9 is devoted entirely to teaching 9<sup>th</sup> grade students basic research skills. In teams, students will design and implement a psychology project and will learn how to properly control scientific experiments, how to keep a detailed experimental notebook, how to search the professional literature, how to statistically analyze data, and how to present findings to the public in the forms of: a scientific paper, 4 PowerPoint presentations, and a poster board display.

### What Will Be Expected Of Me?

You will be expected to meet regularly with the science research teacher during class time. You will be expected to complete specific assignments including a research paper, statistics assignments, 4 PowerPoint presentations, and a poster board. All students compete as teams at the end of the year in the JLM GNNHS Freshman World Cup (the freshman in-house science competition); presenting in this competition is mandatory. Additionally, students will conduct several other investigations that exemplify various laboratory techniques and methods of statistical analysis. You will be expected to do work for Research 9 independently. Students in Research 9 are also expected to attend the annual Senior Symposium, typically held in December, and Celebrate Science Night, typically held in May. These events take place outside of the school day and dates are shared well in advance.

## How Is The Course Taught?

Students meet regularly with the science research teacher to discuss their ongoing work and to discuss the process of developing and executing a research project. Students will also be taught statistics, the skills needed for paper writing, how to create and present a PowerPoint presentation, and how to create a poster board display. Some self-study in the form of videos and manuals specific to the course are required.

## What Are The Completion Requirements?

To complete the course, a student must submit and present a psychology-based research project and meet all other course requirements.

1 unit of credit: Prerequisite: Department permission. Enrollment is limited. Students must apply by the deadline.

## **Research Project Seminar**

### Who Should Take Research Project Seminar?

10th and 11th grade students who have strong student skills, good time management, are self-motivated, and are strong in both math and science should consider this *additional* elective course. Students must apply to and will be accepted by the North High School Department Chair and the North High School Science Research Director. Students new to the district should reach out to the Science Department Chair or the Director of Science Research in order to apply for admission to the course. Students do not have to have taken Research 9 in order to apply for Research Project Seminar.

### What Will We Be Studying In Research Project Seminar?

Research Project Seminar will outline the process of developing an idea for science and/or engineering research and will emphasize a stepwise approach by which that idea is brought to fruition in a completed project. Students are responsible for identifying their area of research. Beyond this, you will be studying in depth the topics most directly concerned with your particular area of research.

### What Will Be Expected Of Me?

You will be expected to meet regularly with the science research teacher during class time. You will be expected to complete specific assignments including a full research paper, statistics assignments, 4 PowerPoint presentations, and a poster board. You will be required to enter at least one external science competition, usually occurring during the spring; presenting in at least one competition is mandatory. You will be expected to do most of the work for the Research Project Seminar independently during your class time. Students in Research Project Seminar are also expected to attend the annual Senior Symposium, typically held in December, and Celebrate Science Night, typically held in May. These events take place outside of the school day and dates are shared well in advance.

### How Is The Course Taught?

Students meet regularly with the science research teacher to discuss their ongoing work and to discuss the process of developing and executing a research project. Students will also be taught statistics and skills in paper writing, though not to the same degree as in Research 9. Self-study in the form of videos and manuals specific to the course are required.

### What Are The Completion Requirements?

To complete the course, a student must submit and display a significant research project in science and/or engineering and meet all other course requirements.

1 unit of credit: Prerequisite: Department permission. Enrollment is limited. Students must apply by the deadline.

### **Senior Science Research**

#### Who Should Take Senior Research?

Qualified senior science students who have completed a significant science research project by September 1st of their senior year at an independent research facility should register for this class. A willingness to self-teach complex scientific ideas and techniques and exquisite time management are a must. Students do not have to have completed research in 9th - 11th grade, though this will significantly increase the likelihood of successful placement in a professional lab over the summer of junior year.

#### What Will Be Expected Of Me?

You will need to find a mentor prior to the summer of your senior year who will support and guide your senior research. You will be expected to conduct and complete significant research during the summer *before* your senior year. You will be expected to meet a series of deadlines leading to the completion of The Regeneron Science Talent Search application and paper; many of these deadlines occur over the summer. Senior projects must be done individually, as group projects are not eligible for the Regeneron STS. In addition, you will be expected to enter your paper in several other science competitions including the Long Island Science & Engineering Fair, The New York State Science and Engineering Fair, the Junior Science and Humanities Symposium, and the WAC Lighting Invitational Science Fair. Seniors will also be expected to be present for and judge the Freshman in-house competition. Students in Senior Research are also expected to attend the annual Senior Symposium at which they will present their research, typically held in December, and Celebrate Science Night, typically held in May. These events take place outside of the school day and dates are shared well in advance. Please note that much of your first quarter grade will be calculated based on your summer work.

### How Is The Course Taught?

Students meet independently with their science research teacher during the summer, typically by ZOOM, and then during the regular school day, during their science research period to plan and execute their paper as well as to write their entrance essays for Regeneron and complete their other course requirements.

## What Are The Completion Requirements?

Students must complete the Regeneron Science Talent Search application as well as a formal research paper, by established deadlines. Failure to submit a viable application to the Regeneron STS will result in a significant grade reduction. Additionally, students will submit their paper to other competitions as appropriate. Students are also required to create a Slides presentation and a poster board for their project, which will be presented at the Senior Science Symposium. Attendance at the Senior Science Symposium is mandatory.

1 unit of credit: Prerequisite: Department permission required. Students must apply by the deadline and find a mentor under whom they will perform their research.