Mission Statement
The mission of the North Carolina School of Science and Mathematics, an intellectually stimulating, diverse, and collaborative community, is to:

- educate academically talented students to become state, national, and global leaders in science, technology, engineering, and mathematics,
- advance public education in North Carolina,
- and inspire innovation for the betterment of humankind,

through challenging residential and virtual programs driven by instructional excellence and the excitement of discovery.
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INTRODUCTION
The course offerings described in the following pages have been developed for the 2015-2016 school year. They have been designed to provide both depth and breadth in the instructional program. An effort is made to accommodate the student’s individual interests, with final decisions on any year’s course offerings based on staff availability and satisfaction of minimum enrollment requirements.

The first consideration in building each student’s course of study is to ensure a thorough grounding in mathematical, scientific, and communications skills and concepts. Students are urged to select an advanced sequence in at least one discipline in science and/or mathematics and also to sample other areas of study through their choice of electives. It is important for students to learn enough about a variety of academic disciplines in mathematics and the sciences and in other fields to become informed decision makers and competent leaders in the technological world of the 21st century.

To address the special needs, interests, and learning styles of a talented student population, the following study options and special programs are provided: Individualized Study, Independent Study, and Seminar Study. Selected mentorship placements with faculty or other professional personnel in neighboring universities, colleges, museums, institutes, laboratories, or industries are arranged and supervised by the Mentorship Program Coordinator, who is a member of the instructional staff.

Junior students are expected to enroll in four core courses for the fall trimester. Once all students have had the opportunity to complete enrollment, juniors have the opportunity to select a fifth core course for fall from among a specified list of courses, if they wish. Otherwise all students are required to be enrolled in five core courses each trimester. Students wishing to enroll in more than five core courses for a trimester must have permission from the Vice Chancellor for Academic Programs. Art courses, music courses, drama courses, designated math and social science electives, physical activity/wellness courses, residential education courses, independent study, and seminar study are not included in the five.

Students’ initial placement in certain courses is based on testing, previous instruction, and other course placements. Students who demonstrate exceptional mastery of English and US History, world languages, chemistry, physics, or biology may qualify to exempt course requirements in that discipline. See Exemption Criteria (page 130) for details. Students are not permitted to exempt the NCSSM mathematics requirement.
Grade reports are issued to students and parents at the end of each trimester. The following letter evaluation system is:

A Outstanding achievement  
B Superior, meets all course requirements  
C Acceptable, minimally meets course requirements  
D Unsatisfactory, no NCSSM credit  
I Incomplete  
S Satisfactory  
U Unsatisfactory

Progress reports are made part way through each term to give students and parents a performance assessment before term grades are reported.

Unless otherwise noted, trimester courses earn one unit of credit; two-trimester courses earn two units of credit; and year courses three units of credit. Some interdisciplinary courses earn double credit each trimester. Partial credit is not granted, except as described in The NCSSM Handbook, for students who withdraw from NCSSM prior to the end of the academic year. Additional information on registration procedures, including guidelines for modifying a course schedule after the beginning of the academic year, is published in The NCSSM Handbook.

Meeting pattern information is listed with each course, below any prerequisites.

The meeting pattern for each course describes how the course meets during the day schedule, using 50 minute class periods and/or one 90 minute combined class and lab period. For example:

Meeting pattern: 4 periods per week

or

Meeting pattern: 4 periods per week including lab

When a course meets outside of the regular day schedule, it meets on a different pattern but for approximately the same amount of time as in the day schedule. Other exceptions are approved by the Vice Chancellor for Academic Programs.
QUALITY POINTS AND GPA

Quality point value of courses is reflected in the NCSSM course numbering system:

<table>
<thead>
<tr>
<th>COURSE #</th>
<th>DESCRIPTION</th>
<th>QUALITY POINTS AWARDED BY LETTER GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 - 349</td>
<td>Introductory level courses that meet a core NCSSM graduation requirement. Comparable to honors level courses at many high schools</td>
<td>A+</td>
</tr>
<tr>
<td>350 - 399</td>
<td>Meet one or more of the following criteria: *accelerated versions of classes at the 300 - 349 level *courses that require prerequisites taken at NCSSM *courses at a level higher than a typical high school honors course *courses that are for seniors only</td>
<td>A+</td>
</tr>
<tr>
<td>400 - 449</td>
<td>Courses at the level of introductory college courses and/or that help prepare students to take an Advanced Placement examination</td>
<td>A+</td>
</tr>
<tr>
<td>450 - 499</td>
<td>Courses that deal with topics beyond those of introductory college courses</td>
<td>A+</td>
</tr>
</tbody>
</table>

ALL NCSSM courses are at the honors level or higher. Physical Activity/Wellness courses, Residential Life courses, Work Service, Service Learning, and Mini-Term are graduation requirements. These courses, however, along with Special Study Options, carry no quality points and are not computed in the GPA.

IMPORTANT NOTE REGARDING QUALITY POINTS AND GPA

Beginning with the Class of 2019 NCSSM will align our quality points with North Carolina public high schools, as established by the North Carolina Board of Education, retaining “C-” as our lowest creditable grade and our unique level of courses between “Honors” and “AP/College level”:

<table>
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<td>A+</td>
</tr>
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4.50 | 3.50 | 2.50 | 0.00
Meet one or more of the following criteria:

* accelerated versions of classes at the 300 - 349 level
* courses that require prerequisites taken at NCSSM
* courses at a level higher than a typical high school honors course
* courses that are for seniors only

<table>
<thead>
<tr>
<th>Course Range</th>
<th>Description</th>
<th>4.75</th>
<th>3.75</th>
<th>2.75</th>
<th>0.00</th>
</tr>
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<tbody>
<tr>
<td>350 - 399</td>
<td>Courses at the level of introductory college courses and/or that help prepare students to take an Advanced Placement examination</td>
<td>5.00</td>
<td>4.00</td>
<td>3.00</td>
<td>0.00</td>
</tr>
<tr>
<td>400 - 449</td>
<td>Courses that deal with topics beyond those of introductory college courses</td>
<td>5.00</td>
<td>4.00</td>
<td>3.00</td>
<td>0.00</td>
</tr>
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All NCSSM courses are at the honors level or higher. Physical Activity/Wellness courses, Residential Life courses, Work Service, Service Learning, and Mini-Term are graduation requirements. These courses, however, along with Special Study Options, carry no quality points and are not computed in the GPA.

**CLASS RANK**

The school population is highly motivated and selected through a competitive process. Since the majority of students are clustered near the top of the grading scale, it would neither benefit students nor clarify the character of the academic program to rank students.

**NCSSM AND THE ADVANCED PLACEMENT PROGRAM**

Advanced Placement (AP) is a program of college level courses and examinations that gives advanced, motivated students an opportunity to earn college credit, college placement, or both while they are still in high school. NCSSM is committed to supporting students in their desire to take advantage of the college credit and placement opportunities afforded by the AP program.

A number of NCSSM courses are designed to prepare students for the AP examination in that subject. Such courses include “AP” in the course title. Some other courses include concepts from the AP examination (see course descriptions for specifics). While students who master the material in these courses are generally prepared for the AP examination in that subject, extra review materials are offered in many of these subjects for students who wish to further prepare. For AP subjects that may not be covered extensively in the regular curriculum, faculty members sometimes sponsor interested students in a Special Study Option to assist in AP preparation. Academic credit is available for such options (see page 127 Study Options and Special Programs). There is also a collection of AP review and preparation materials in the NCSSM Library.
In recent years, approximately 82% of each graduating class has taken one or more AP examinations. Of NCSSM students sitting for the examinations, approximately 72% scored a 4 or 5 (this compares with approximately 34% of all AP test-takers). Another 19% of NCSSM students sitting for AP examinations scored a 3 (see the NCSSM Profile).

**SPECIAL NOTICE**
This catalog lists all of those courses that the School is prepared to offer. Since the total enrollment of the School is relatively small, it may not be possible or desirable to offer all courses every year. If faculty resources are not available, or if the enrollment for a given course does not meet the minimum instructional number of students, the course may not be offered. In planning their instructional programs, students should be prepared to elect alternative courses if their first choice is not available.
RESEARCH AT NCSSM
Recognizing the importance of technical and problem-solving skills and the increasing demand for research learning opportunities among our students, NCSSM offers a variety of research options for both juniors and seniors. Whether highly specialized research leading to involvement in national competition or exposure at a more basic level to the academic research process, the goal is to meet our students where they are in terms of previous experience and potential interest and to equip them to take full advantage of the growing number of research programs available to undergraduates at the university level.

NCSSM’s student research programs, along with the courses involved, are described below. See the applicable section of the catalog for specific course descriptions, pre-requisites, and other important information about these opportunities.

Research Experience
Research Experience courses provide research skills development and the opportunity to complete a research project in the subject areas indicated. There are no prerequisites and these single-term courses are available to juniors or seniors. Some students, upon completion of the course, may elect to be considered for other research opportunities at NCSSM, although it is not required.

Course options are:
BI390 Research Experience in Biology
CH390 Research Experience in Chemistry
EE390 Research Experience in Engineering
IE390 Research Experience in the Humanities
PH390 Research Experience in Physics

Mentorship
Mentorship is for students who want to develop research skills as part of an opportunity to work in an off-campus lab or other real world setting with a research professional. Entry is by application to the Mentorship Coordinator, and the sequence begins in the spring trimester of the junior year with an explorations course designed to prepare students for the mentorship experience. That is followed in the fall and winter trimesters of the senior year with an off-campus mentorship, in which students spend two full afternoons each week working on an independent project or as part of an ongoing project currently underway at an area university or in a Research Triangle Park lab under the guidance of one or more mentors.
Courses:
IE308 Explorations in Mentorship
IE405 Mentorship – Senior Research

Research in the Humanities
Research in the Humanities is an opportunity for students who want to initiate or continue an in-depth scholarly investigation of their own design. This single-term course is available to those who have completed IE390 Research Experience in the Humanities and who have been approved by the Dean of Humanities. The research is often interdisciplinary in nature and results in the creation of new knowledge. Students present their research at NCSSM’s annual Research Symposium and may also present at the Junior Science and Humanities Symposium. In addition, they explore opportunities for publication.

Course:
IE490 Research in the Humanities

Research in Engineering
Research in engineering is an opportunity for students who want to initiate or continue an in-depth project of their own design. Entry is by application and requires permission of the Dean of Engineering. The sequence begins as early as the winter trimester of the junior year and continues for up to two trimesters through the planning, implementation, analysis and presentation of an original research project. Students may have the opportunity to participate in summer research programs on campus or in the triangle area and have the option of entering their work in state or national competitions.

Courses:
EE442 Research in Engineering I
EE444 Research in Engineering II

Research in Science: Biology, Chemistry or Physics
Research courses in a specific scientific discipline are for students who want to initiate or continue an in-depth research project of their own design. Entry is by application to the designated research instructor and requires permission of the Dean of Science. The sequence begins as early as the winter trimester of the junior year and continues up to four trimesters through the planning, implementation, analysis, and presentation of an original research project. Students often participate in summer research programs on campus or in the Triangle area and/or have the option of entering their work in state or national competitions.
Courses:
BI442 Research in Biology I
BI444 Research in Biology II
BI446 Research in Biology III
BI448 Research in Biology IV
CH442 Research in Chemistry I
CH444 Research in Chemistry II
CH446 Research in Chemistry III
CH448 Research in Chemistry IV
PH442 Research in Physics I
PH444 Research in Physics II
PH446 Research in Physics III
PH448 Research in Physics IV

Research in Science: Computational Science
Computational science is a new research methodology that uses mathematical models and simulations to study complex scientific problems. Research in Computational Science provides students with the opportunity to learn the technologies, techniques, and tools of computational science as applied to interesting and complex problems in biology, chemistry, physics, medicine, environmental and earth sciences, or other disciplines. Entry is by application to the instructor and requires permission of the Dean of Science. The sequence begins as early as the winter trimester of the junior year and continues up to four trimesters through the planning, implementation, analysis, and presentation of an original research project. Students interested in biology have the opportunity to participate in a videoconferencing computational biology (bioinformatics) program with the Jackson Genomics Lab in Maine.

Courses:
IE442 Research in Computational Science I
IE444 Research in Computational Science II
IE446 Research in Computational Science III
IE448 Research in Computational Science IV

Research in Mathematics
The Research in Mathematics courses give advanced students the opportunity to engage in a true research project in mathematics. Students work for one or two trimesters with a small research team investigating an unsolved problem in mathematics, typically in the fields of graph theory and game theory. Successful research is submitted for publication and to the Siemens and Intel Research contests. To be considered for MA472 Research in Mathematics, interested students must
qualify for, and enroll in, MA466 Graph Theory/Introduction to Proof or enroll in the Research in Mathematics MiniTerm course and be approved by the Dean of Mathematics. Interested Junior students qualified for MA466 Graph Theory/Introduction to Proof are especially encouraged to take it in fall of junior year.

Courses:
MA472 Research in Mathematics I
MA474 Research in Mathematics II

**NCSSM Research Symposium**
Each spring NCSSM showcases its student research programs in a Research Symposium, at which students present the results of their research activities though oral and/or poster presentations to the NCSSM community and invited guests.

**Summer Research Opportunities**
Juniors are encouraged to participate in additional research opportunities available during the summer break, whether sponsored by NCSSM or by outside agencies or programs. Summer research activities are especially important for students interested in competing in national competitions such as the Siemens Competition in Math, Science & Technology or the Intel Science Talent Search. NCSSM-sponsored research programs are posted on the School’s website while outside research opportunities are made available through individual academic departments and the Counseling Services Office.
DEPARTMENT OF ENGINEERING AND TECHNOLOGY
The Department of Engineering and Technology provides opportunities for students to take specialized courses that build on the knowledge and skills they develop in courses offered by the Science, Mathematics and Humanities Departments. Engineering and Technology courses focus on professional areas such as architecture, computer science, engineering, and robotics. These courses teach fundamental skills such as critical thinking and problem-solving while giving students an educational experience to help inform their decisions about college majors and professions.

Graduation Requirement in Engineering and Technology
Unless exempted (see page 130 Exemption Criteria), every student must complete at least one unit of core credit in an engineering or computer science course. Students who qualify to exempt the NCSSM engineering and technology requirement are not required to take additional coursework in this subject area at NCSSM.

COMPUTER SCIENCE

CS312 Foundations in Modern Computing
One trimester
Credit: One unit core engineering/technology or core elective credit
Meeting pattern: Four periods per week, including lab.

This course is for creating educated and productive citizens who are able to thrive in a world where computing is changing how we live and think. Unlike traditional computer science courses, writing code is deemphasized in favor of innovation, impact, and an understanding of how computing is woven into the fabric of everything that we do. Topics include algorithms, networks, crowd-sourcing, internet form and function, and big data concepts such as genomic/person-specific medicine.

CS352 Web Development
One trimester
Credit: One unit core engineering/technology or core elective credit
Meeting pattern: Four periods per week including lab.

This course teaches students how to produce dynamic web pages by specifying structure with XHTML/HTML5, appearance with CSS and behavior with JavaScript. All necessary techniques are developed from the ground up, including the canvas object and the document object model. Several projects of increasing complexity are completed during
the term. The course also includes an introduction to linux file system, client side AJAX, and a popular web framework such as jQuery, prototype, Dojo, or Scriptaculous.

**CS354 Databases**  
*One trimester*  
*Credit: One unit core engineering/technology or core elective credit*  
*Prerequisite: CS352 Web Development or permission of the Dean of Engineering and Technology.*  
*Meeting pattern: Four periods per week including lab.*

Databases are everywhere, and they come in many flavors. They are not just in obvious places like Facebook and Twitter. There are also hundreds of databases installed on the phone in your hand. You may find that your life would be easier if you were able to build a few of them for yourself. This course introduces students to basic database concepts, gives them experience using databases for real-world applications, and demonstrates how one size most certainly does not fit all. Topics include: relational databases, SQL wizardry, database design, Object-Relational Mappers (ActiveRecord in Ruby on Rails), scalability and concurrency concerns, and NoSQL systems such as MongoDB and HBase.

**NOTE:** Students who took CS350 Databases in 2014-2015 are not eligible to take this course.

**CS402 AP Computer Science A (I)**  
*One trimester*  
*Credit: One unit core engineering/technology or core elective credit.*  
*Prerequisite: Prior programming experience and permission of the Dean of Engineering and Technology.*  
*Meeting pattern: Four periods per week including lab.*

This intermediate course emphasizes the design and implementation of basic computer programs. Students begin by learning the programming language Python. This is an object-oriented scripting language with very simple structure that is used to develop basic programming and problem-solving skills. Students completing this course are able to write simple programs consisting of multiple modules. It is assumed that the student has prior programming experience.

**CS404 AP Computer Science A (II)**  
*One trimester*  
*Credit: One unit core engineering/technology or core elective credit.*
Prerequisite: CS402 AP Computer Science A (I) or permission of the Dean of Engineering and Technology.
Meeting pattern: Four periods per week including lab.

This class covers the bulk of the ‘A’ curriculum of the AP Syllabus as well as the development of full-featured GUI applications that are event driven and which are able to save application state to a file. The entire apparatus of object-oriented programming is addressed, including inheritance, interfaces, inner classes, exception handling and file I/O. Several case studies of increasing sophistication are created in class to put object-oriented constructs into context. A final project is assigned in which the students work in a small team to develop a complete, working application.

CS406 AP Computer Science A (III)
One trimester
Credit: One unit core engineering/technology or core elective credit.
Prerequisite: CS404 AP Computer Science A (II) or permission of the Dean of Engineering and Technology.
Meeting pattern: Four periods per week including lab.

This class begins by studying the list model of data structures and by building link and array based implementations of a common list interface. This effort gives a view of data structures from the inside that is necessary to understand how to design and build custom structures. Then the collection framework and the modern construct of streams is used to filter, manipulate and classify data. A variety of algorithms implemented in these containers are also studied, including an analysis of their run times. This course covers the remaining topics in the AP Syllabus and the AP Case Study.

CS408 Elements of Computer Systems
One trimester
Credit: One unit core engineering/technology or core elective credit.
Prerequisite: CS402 AP Computer Science A (I) or permission of the Dean of Engineering and Technology.
Meeting pattern: Four periods per week including lab.

This course, designed for students with solid computing skills in a Turing-complete language such as Python, Java, or C/C++, answers the question “When I write a program and run it, what chain of events causes it to execute?”. We begin at the level of logic gates and progress to a simplified high-level language. The student gains insight into the workings of the arithmetic logic unit, the central processing unit, and their
interactions with memory. The student also sees how the compiler works, how it translates the code into assembly language and how the assembly language ultimately interacts with the computer’s architecture. The insights gained in this course help the student become a better programmer by having a better understanding of what is happening underneath a high-level language.

**CS410 Data Structures**  
*One trimester*  
**Credit:** One unit core engineering/technology or core elective credit.  
**Prerequisite:** CS404 AP Computer Science A (II) or permission of the Dean of Engineering and Technology.  
**Meeting pattern:** Four periods per week including lab.

This course covers one-dimensional data structures, recursive data structures, analysis of sorting and searching algorithms, and a brief overview of big-O analysis. Queues, stacks, lists, and arrays are studied in detail.

**CS412 Data Structures II**  
*One trimester*  
**Credit:** One unit core engineering/technology or core elective credit.  
**Prerequisite:** CS410 Data Structures I or permission of the Dean of Engineering and Technology.  
**Meeting pattern:** Four periods per week including lab.

Emphasis is on two-dimensional data structures including trees, expression trees, search trees, heaps, and priority queues. Algorithms include tree traversal, application of heaps, and evaluating expression trees. Also studied are sets, maps, hash tables, and graphs; and various algorithms are implanted on these.

**CS414 Data Structures III**  
*One trimester*  
**Credit:** One unit core engineering/technology or core elective credit.  
**Prerequisite:** CS412 Data Structures II or permission of the Dean of Engineering and Technology.  
**Meeting pattern:** Four periods per week including lab.

This course is a practicum in advanced techniques that apply the ideas of CS402, CS404, CS410, and CS412 including such topics as web programming, databases, threads, and advanced GUI techniques. The AP case study is used throughout as a source of examples.
CS490, CS492, AND CS494 Advanced Computer Science Topics
One trimester each
Credit: One unit each core engineering/technology or core elective credit.
Prerequisite: Permission of the Dean of Engineering and Technology.

This course offers an opportunity for students with an especially strong background in computer science to pursue a rigorous study of a topic outside the standard curriculum. This course is intended for students who have exhausted the other course offerings in computer science or who wish to do independent research in computer science.

ENGINEERING

EE308 History of Engineering and Technology
One trimester
Credit: One unit core engineering/technology or core elective credit.
Meeting pattern: Four periods per week.

This course explores the history of engineering and technology in its cultural, ethical, and scientific context. We focus on historical readings, projects, and labs to illuminate the development and relevance of this history.

EE310 Engineering Graphics
One trimester
Credit: One unit core engineering/technology or core elective credit.
Meeting pattern: Four periods per week including lab.

This course provides in-depth instruction in computer graphics. The goal of this course is to learn how to use computer-aided design (CAD) software to graphically represent two-dimensional and three-dimensional objects. This course emphasizes product design, assembly drawing, and exploded views. This course is well-suited to students considering a career in engineering or research, and for those students who wish to become more effective in visually communicating technical information in any profession. The final project is an original design of a functional object complete with all drawings necessary for its construction.

EE316 Introductory Robotics
One trimester
Credit: One unit core engineering/technology or core elective credit.
Meeting pattern: Four periods per week including lab.
This course provides students with the opportunity to develop skills in simple basic programming of an autonomous robot, use of radio controllers, simple sensors and tracking; gaming strategy, teamwork, design, and some basic tool skills. The instruction is both traditional and project-based. A significant portion of the course is dedicated to the design and completion of an instructor-approved individual project chosen by the student.

**EE318 Fundamentals of Engineering**
*One trimester*
*Credit: One unit core engineering/technology or core elective credit*
*Meeting pattern: Four periods per week including lab.*

This course introduces students to the various fields of engineering, the engineering design process, and to core math and science concepts that encompass all fields of engineering. Students examine ethics in engineering and technical communication needed for successful engineering practices. Students engage in course content through multi-sensory, hands-on activities and projects in order to fully understand and apply the concepts covered. The course concludes with a capstone design project.

**EE350 Mechanical Engineering**
*One trimester*
*Credit: One unit core engineering/technology or core elective credit.*
*Meeting Pattern: Four periods per week including lab.*

This course introduces students to the study and practice of mechanical engineering. Using activities, design projects, and laboratory modules students learn how engineers use mathematics and science to design efficient and beneficial devices such as automobiles, power plants, airplanes, machinery, and heating/cooling equipment. Topics include engineering design, simple machines, mechanisms, materials, dynamics, heat transfer, thermodynamics, fluid dynamics, and modeling.

**EE352 Electrical Engineering**
*One trimester*
*Credit: One unit core engineering/technology or core elective credit.*
*Meeting pattern: Four periods per week including lab.*

This course introduces students to topics important to the fields of electrical, electronic, and computer engineering. Using activities, laboratory modules, and a major design project students learn first-hand
how electrical engineers analyze and solve problems. Topics include basic DC and AC circuits, OpAmps, semiconductors, and logic design.

**EE354 Architecture**  
*One trimester*  
*Credit:* One unit core engineering/technology or core elective credit.  
*Meeting pattern:* Four periods per week including lab.

This course introduces students to the field of architecture. Students use industry-standard software (Revit Architecture) to design buildings. Driven by hands-on projects and activities, this course covers topics such as architectural history, structural engineering, green building, project planning, site planning, building design, and project documentation. The final project is the design of a house for a client, giving students the opportunity to model the real-world experiences of architects.

**EE356 Civil and Environmental Engineering**  
*One trimester*  
*Credit:* One unit core engineering/technology or core elective credit.  
*Meeting pattern:* Four periods per week including lab.

This course introduces students to the study and practice of civil and environmental engineering. Students explore the wide variety of fields of study in engineering, focusing on topics important to the fields of civil and environmental engineering and environmental management. Using activities, design projects, and laboratory modules students learn first-hand how engineers use mathematics and science to solve problems. Topics include engineering design, strength of materials, statics, dynamics of structures, graphical information systems, pollutant fate and transport, hydrology, and environmental modeling.

**EE358 Biomedical Engineering**  
*One trimester*  
*Credit:* One unit core engineering/technology or core elective credit.  
*Meeting pattern:* Four periods per week including lab.

This course introduces students to the different sub-specialties of biomedical engineering including biomaterials, biomechanics, bioelectricity, biomedical devices, and measurements, as well as design. Through hands-on labs, activities, and collaborative design projects students kinesthetically explore and experience biomedical engineering principles, the engineering design process, and problem solving and troubleshooting.
**EE360 Chemical Engineering**

*One trimester*

**Credit:** One unit core engineering/technology or core elective credit.

**Prerequisite:** Completion of a high school chemistry course and a high school algebra course.

**Meeting pattern:** Four periods per week including lab.

This course introduces students to the field of chemical engineering. Basic principles of chemical engineering and associated calculations involving data analysis, dimensional homogeneity, and material balances are used to solve real world problems that a working chemical engineer typically encounters. Hands-on lab activities enable students to kinesthetically explore and experience chemical engineering principles, elementary process control and troubleshooting.

**EE362 Engineering the Modern**

*One trimester*

**Credit:** One unit core engineering/technology or core elective credit.

**Meeting Pattern:** Four periods per week.

This course examines the transformations in engineering, science, and the arts that define the birth of Modernism in the late nineteenth and early twentieth centuries. The visual arts, music, architecture, literature, engineering, science, and technology are examined against the background of historical and political events in order to comprehend the links between the arts, technology, engineering, and science. Topics include the construction of the Brooklyn and Eads Bridges, steel and the skyscraper, Frank Lloyd Wright, the Wright Brothers and the airplane, Einstein and Heisenberg, World War I’s impact and technology, automation and the automobile, the computer, the movies, Dada, Kafka, Woolf, and the emergence of abstraction in art and atonality in music. Assessments for the course are designed to allow students to develop their analytical reasoning, critical thinking skills, and ability to communicate ideas across disciplines.

**EE390 Research Experience in Engineering**

*One trimester*

**Credit:** One unit core engineering/technology or core elective credit

**Meeting pattern:** Four periods per week including lab.

This introductory course is for students who wish to pursue a research opportunity in engineering. Participants learn basic research skills in methodology, research design, and literature review. During the first part of the course students learn to design and conduct an experiment,
analyze data, and present their findings in a written paper. In addition, students read and discuss research articles, including those of local professional engineers. When possible, a local engineer joins us in the laboratory for a hands-on, directed project. The second portion of the course is devoted to working in small groups on a research project. Research questions may be selected from an area identified by the instructor (examples: mechanical engineering, civil/environmental engineering, or biomechanics), or from topics proposed by the student if appropriate. Students then write a final paper describing their research project and make a formal oral presentation of their findings.

**EE442 Research in Engineering I**
One trimester
Credit: One unit core engineering/technology or core elective credit
Prerequisite: Permission of the Dean of Engineering and Technology
Meeting pattern: Eight periods per week including two labs.

Research in Engineering I is an advanced course for second trimester junior students with the motivation, independence, and maturity necessary to conduct their own research or engineering design project. Students learn research methodology, experimental design, and the engineering design process before conducting a small scale experiment and engineering design project. Students then write a literature review as well as their own research proposal or design specification for a problem of interest to them. Throughout the term students read from the primary engineering literature and participate in discussion groups on current issues in engineering research. Students with a final grade of B or higher are encouraged to continue in EE444 Research in Engineering II.

**EE444 Research in Engineering II**
One trimester
Credit: One unit core engineering/technology or core elective credit
Prerequisite: Final grade of B or higher in EE442 Research in Engineering I and permission of the Dean of Engineering and Technology
Meeting pattern: Eight periods per week including two labs.

In Research in Engineering II, students continue to gather and analyze experimental data or complete their design project based on their previous trimester work. Time is devoted to the completion of the research or design project and a written paper. Students are required to present their results at the NCSSM Research Symposium and are encouraged to present their research at the North Carolina Student Academy of Science competition and other state and national competitions.
EE452 Biomedical Instrumentation
One trimester
Credit: One unit core engineering/technology or core elective credit.
Prerequisite: MA412 AP Calculus AB (II) and final grade of B or higher in EE352 Electrical Engineering, or permission of the Dean of Engineering and Technology.
Meeting pattern: Four periods per week including lab.

In this course students learn the basic principles of electronic instrumentation with biomedical examples. Concepts of analog signal processing, filters, and input and output impedances are emphasized. Students are exposed to system design concepts such as amplifier design and various transducers. Laboratories reinforce basic concepts and offer the student design opportunities in groups. Course includes a final design project.

EE454 Statics
One trimester
Credit: One unit core engineering/technology or core elective credit.
Prerequisite: MA412 AP Calculus AB (Advanced Topics II) and PH355a Physics with Advanced Topics or PH404 AP Physics C: Mechanics (II), or permission of the Dean of Engineering and Technology.
Meeting pattern: Four periods per week.

In this course students learn how to apply the principles of Mechanics to problems of equilibrium. Topics include: vectors, moments, analysis of force systems (trusses, frames, and machines), rigid body equilibrium, center of gravity, and moment of inertia.

EE456 Circuits
One trimester
Credit: One unit core engineering/technology or core elective credit.
Prerequisite: MA412 AP Calculus AB (II) and final grade of B or higher in EE352 Electrical Engineering, or permission of the Dean of Engineering and Technology.
Meeting pattern: Four periods per week including lab.

In this course, students continue the study of electrical circuits, including DC circuit analysis and theorems, op-amps, first and second order circuits, transient analysis, AC sinusoids and phasors, sinusoidal steady-rate analysis, AC power analysis, three-phase circuits, magnetically coupled circuits, frequency response, and Laplace and Fourier transforms. Laboratories reinforce basic concepts and offer student design opportunities.
DEPARTMENT OF HUMANITIES
NCSSM’s humanities courses challenge students to think critically and creatively; to expand their understanding of their own and other cultures; to be open to new ideas and ways of thinking; and to express their understanding in clear and effective writing and speech. Many of our courses reflect the department’s longstanding commitment to interdisciplinary approaches to teaching and learning, which challenge students to make connections between and among areas of knowledge. Our fine arts courses challenge students to grow both as performing artists and as audience members. Our courses empower students to become the kind of leaders who have the flexibility of mind to think “outside the box” of discrete areas of knowledge, the keenness of vision to make connections, the confidence to challenge received wisdom, and the imagination, ingenuity, and energy to create original solutions to complex problems.

Graduation Requirement in Humanities
All junior students must complete the three-trimester, interdisciplinary AS303 Writing and American Studies or AS305 American Studies, or be exempt. All students must complete an additional two trimesters of core English credit. Students who exempt the American Studies requirement must complete four units of core English credit and at least two units of history or social science credit. Students must also complete study of a world language through the intermediate level or higher at NCSSM, or be exempt.

COURSE OFFERINGS: Art

AR304 Ceramics
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Three periods per week.

Designed for beginning, intermediate, and advanced students, this course teaches the basics of hand-building and wheelthrowing earthenware and stoneware clays, and includes glaze composition and kiln firing. Repeatable for credit.

AR306 Photography
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Two periods per week.
Students learn how to use 35 mm film cameras, how to develop their own film, and how to make photographic prints on paper. This class utilizes in-class demonstrations, instructor-assisted darkroom work, and independent student work so that students become confident in their abilities in conceiving and executing photographic prints. This course is primarily black-and-white film-based photography. Repeatable for credit.

**AR308 Graphic and Media Design**
*One trimester*
*Credit: One unit additional elective credit.*
*Meeting pattern: Three periods per week.*

The course aims to help students develop an understanding of good design. Assignments include web design, illustration, animation, and media art. This class involves in-class demonstrations and supervised work sessions as well as out-of-class work. Students assemble a portfolio of their work on CD in order to complete this course. Repeatable for credit.

**AR310 Printmaking**
*One trimester*
*Credit: One unit additional elective credit.*
*Meeting pattern: Two periods per week.*

This studio course introduces basic printmaking processes and equipment with equal emphasis on concept and technique. Students are introduced to a variety of print media and methods, such as relief, intaglio and screen printing, and various approaches to making and printing plates in each medium. Students are expected to develop an understanding of each medium and to learn good studio habits; safe and responsive handling of tools, materials, and grounds; and the knowledge required for basic manipulation of the processes used in the production of a printed image. Repeatable for credit.

**AR312 Acrylic Painting**
*One trimester*
*Credit: One unit additional elective credit.*
*Meeting pattern: Three periods per week.*

The course cultivates students' interest and appreciation for acrylic painting. The subjects include still life, landscape, and portrait acrylic painting, as well as art theory and appreciation. This course involves in-class demonstrations and supervised work sessions as well as out-of-class work. Students assemble a portfolio of their completed work. Repeatable for credit.
AR314 Oil Painting
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Three periods per week.

The course cultivates students’ interest and appreciation for oil painting. The subjects include still life, landscape, and portrait oil painting, as well as art theory and appreciation. This class involves in-class demonstrations and supervised work sessions as well as out-of-class work. Students assemble a portfolio of their work completed in this course. Repeatable for credit.

AR316 Digital Fine Art Photography
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Two periods per week.

This course introduces students to the concepts and techniques necessary to create, edit, and store color photographic images using digital technology. Units on color theory, image-editing, printing options, and digital image storage are also covered. Students focus on personal exploration using technology as a creative medium for visual expression. Repeatable for credit.

COURSE OFFERINGS: Drama

DR302, DR304, DR306 Theater Performance Workshop
One trimester each
Credit: One unit each additional elective credit.
Meeting pattern: Two periods per week plus one 100-minute evening class meeting.

This course focuses on the craft of stage performance beginning with rudiments of acting and building outwards to develop the skills and vocabulary of the theater artist. Students survey several acting methods working as individuals and cooperative ensembles in the study of topics including voice, movement, improvisation, characterization, scene work, and text analysis for stage. As the course progresses, our study expands to skills in direction and technical design/operation. During each class, students participate in acting exercises that include structured peer feedback and often require physical activity. In addition, students enrolled are required to apply their classroom experience by participating
in some capacity in the coinciding drama board theatrical production. No previous experience is required. Repeatable for credit.

**COURSE OFFERINGS: English**

**Graduation Requirement in English**
All junior students must complete the three-trimester, interdisciplinary AS303 Writing and American Studies or AS305 American Studies, or be exempt. All students must earn two additional units of core English credit. See page 130 for conditions and options for exemption.

**AS303a/AS303b/AS303c Writing and American Studies**
One year
Credit: Three units core English credit, three units core history/social science credit.
Prerequisite: Placement by the Dean of Humanities.
Meeting pattern: Five periods per week including lab (trimester 1), four periods per week including lab (trimesters 2 and 3).

Writing and American Studies is a team-taught, interdisciplinary course that teaches students to read, write, and think about history, literature, and the visual arts as strands within the cultural fabric of the American past. The course begins with the first European encounters with “new” lands and peoples in the late fifteenth century. It concludes with the global economies and virtual communities of the present. In examining the American experience from multiple perspectives, students develop a more nuanced sense of what America is and what it means to be an American. This course in American Studies focuses on developing basic skills in reading, writing, and interpretation. Working collaboratively in small groups and with their teachers, students hone their skills in reading, in analyzing what they read, and in planning, developing, and writing the academic essay with precision, insight, and eloquence. Though the program emphasizes the development of reading and writing skills, it is grounded in the same curricular content as AS305 American Studies and prepares students for NCSSM core English courses. During the second and third trimesters, students continue their exploration of the literary, historical, and artistic heritage of America, while at the same time they continue to build their strengths as readers and writers.

**AS305a/AS305b/AS305c American Studies**
One year
Credit: Three units core English credit, three units core history/social science credit.
Prerequisite: Placement by the Dean of Humanities.
American Studies is a team-taught, interdisciplinary course that presents history, literature, and the arts as strands within a complex cultural fabric. The course begins with the first European encounters with "new" lands and peoples in the late fifteenth century. It concludes with the global economies and virtual communities of the present. In examining the American experience from multiple perspectives, students develop a more nuanced sense of what America is and what it means to be an American. Making use of tools from many disciplines to analyze what they are reading and seeing, students also learn to think and speak with greater clarity, power, and eloquence. The writing component of the course centers on the academic essay, which invites students to wrestle with texts and contexts and, in the process, to articulate what they have learned and why it is important.

**EN352 African American Studies**  
*One trimester*  
*Credit:* One unit core elective credit.  
*Meeting pattern:* Three periods per week including lab.

Spike Lee has said, “We’ve gone through the names—Negro, African American, African, Black. For me, that’s an indication of a people still trying to find their identity.” This interdisciplinary course is an introduction to African American history, literature, and culture and provides students with greater awareness of the black experience within the majority culture. Students examine significant social, political, economic, and religious issues as well as issues of identity in the lives of African Americans from the sixteenth century to the present. In addition to readings in historical backgrounds and documents, students explore texts ranging from slave narratives, folktales, and spirituals to the works of writers, artists, and musicians during the Harlem Renaissance to contemporary works by such writers as Alice Walker and Henry Louis Gates, Jr. and filmmaker Spike Lee. Through a variety of assignments and activities, students continue to develop their skills in reading, research, critical thinking, speaking, and writing.

**EN354 Fiction Writing**  
*One trimester*  
*Credit:* One unit core elective credit.  
*Meeting pattern:* Three periods per week including lab.
This course is designed to serve as a workshop for aspiring fiction writers. M As a workshop, class sessions are run on a collaborative basis, with all students participating in critiques and general discussions. The objective of the course is to develop the student’s sense of the possibilities of narrative fiction, including such components as character, plot, setting, tone, voice, and point of view. Students also learn to use critical terms and approaches appropriate to the task of writing imaginative prose. In addition, we read the work of well-known short fiction writers concurrently with our other class work. These readings are illustrative of principles of craft, theme, and subject and give students a broad base for surveying the field of short story writing. Final evaluation is based chiefly on a portfolio that each student develops from class assignments and approved outside work. Individual attention is given to the development of the portfolio in regular conferences.

EN356 Film Studies
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

Filmmaker Orson Welles once said, “A film is a ribbon of dreams. The camera is much more than a recording apparatus; it is a medium via which messages reach us from another world that is not ours and that brings us to the heart of a great secret. Here magic begins.” In a culture that increasingly relies on visual information, a comprehension of how meaning grows out of the moving image is essential. This course is a historical and critical survey of the American motion picture both as a developing art form and as a medium of mass communication. The course entails systematic analysis of how filmmakers use sound and image to tell stories on the screen. We view selected films as case studies to understand the relationship between theory and practice in filmmaking. Through explorations of the historical, social, and political dimensions of filmmaking, students learn to read and write more effectively, to look at the world with a critical eye, and most importantly, to develop a critical audio-visual literacy. Students demonstrate what they have learned through independent projects and writing assignments.

EN358 Modern Drama: Who’s Afraid of Edward Albee?
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

This course examines the plays of twentieth-century European and American authors such as Anton Chekhov, Tennessee Williams, Edward
Albee, Tom Stoppard, and Wendy Wasserstein. The class uses performance rehearsal techniques to explore the plays. No acting experience or talent is required, only a willingness to stand and deliver with everyone else. Students also critique film productions of some of the plays. This course develops students’ skills in reading, writing, critical thinking, research, and public speaking.

**EN362 Classical Myth: Epic and Tragedy**

*One trimester*

*Credit:* One unit core elective credit.

*Meeting pattern:* Three periods per week including lab.

The creation of the world. The rise of Zeus. The birth of Athena. The abduction of Persephone. The fall of Troy. The wanderings and homecoming of Odysseus. For nearly three thousand years, these stories of gods and mortals have gripped the imaginations of Western listeners and readers. In this course, we explore major myths of the ancient Greeks and Romans, with a special emphasis on how these oral tales were committed to writing in epic poems and tragic plays. Throughout the course, we seek to understand these myths in the geographical, historical, and cultural contexts in which they were created. We read ancient Greek and Roman texts in English translation, including works by Homer, Hesiod, Aeschylus, Sophocles, Euripides, Vergil, and Ovid. Ancient works of art and architecture, including vase paintings and sculpture, form a rich complement to these written sources. We also explore major theories of myth interpretation – from approaches taken by the ancient Greeks themselves to those developed by modern-day theorists – and apply these theories to the myths we encounter. Finally, we explore how later artists, writers, and filmmakers have appropriated, interpreted, and transformed these ancient stories into new forms – often for very different purposes than those served by the myths in the ancient world. Although most of the assessments are essay-based, we also take these ancient myths into our own imaginations in a deep and powerful way and transform them into our own original creations – poems, narratives, dramatic scenes, visual art, and other forms. Our journey together culminates in a public performance of these metamorphoses.

**EN366 Poetry Writing**

*One trimester*

*Credit:* One unit core elective credit.

*Meeting pattern:* Three periods per week including lab.

“I love this – you will love this.” Jonathan Safran Foer’s shorthand definition of art provides a context for this course, an introduction to the
composition and understanding of poetry. Topics include the current state of poetry writing and publication, the influence of other art forms on poetry, and the role of poetry as a means of both artistic expression and social communication. Assignments focus on developing the tools necessary for writing in a variety of styles, along with developing the habits to enable the generation of ideas, the creation of an authentic voice, the construction of narrative and image, and the process of revision. Throughout the trimester, students accumulate a group of works written in and out of class for inclusion in a portfolio that is the foundation of students' assessment in the course.

**EN368 Gram-O-Rama**
One trimester
Credit: One unit core elective credit
Meeting pattern: Four periods per week including lab.

Formal teaching of grammar bit the dust in the 1960's. Gram-O-Rama is a language laboratory, a verbal arts studio where we attempt to replace the cool mechanics of tradition with the sizzle of experiment. Students interested in wordplay, word power, linguistic acrobatics, the elasticity of syntax, and the profundity of the absurd and incongruous write and perform pieces that explore the music of language and the collusion of sense and nonsense. This is a class that aims to turn the serious study of grammar into performance art. The course culminates in a public performance of selected sketches and skits students have written during the course of the trimester.

**EN400 East-West Studies I: Intellectual Frameworks and Ethical Foundations**
One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Four periods per week including lab.

This course explores intersections of East Asian and Western civilizations while simultaneously comparing and contrasting their unique cultural trajectories. We seek to compare and contrast the historical experiences, cultural values and products of civilizations inhabiting opposite extremes of the Eurasian landmass. Given the existence of numerous stereotypes that emphasize divergence, we aim to explore patterns of both similarity and difference. Readings may include excerpts from Thucydides' *History of the Peloponnesian War*, Sima Qian’s *Records of the Historian*, Sun Tzu’s...
Art of War, Julius Caesar’s *de Bello Gallico*, Marcus Aurelius’ *Meditations*, Confucius’ *Analects*, Laozi’s *Dao de Jing*, the Bible, the Koran, Buddhist sutras, Homer’s *Iliad*, Luo Guanzhong’s *Three Kingdoms*, St. Augustine’s *City of God*, collected writings of the Church fathers, Castiglione’s *Book of the Courtier*, Sei Shonagon’s *Pillow Book* and Murasaki Shikibu’s *Tale of Genji*. Students reflect on the intellectual frameworks and ethical foundations of East Asia and the West and analyze the evolution and manifestations of these ideas and values in cultural products, institutions, rituals and ceremonies. In pursuit of these goals, students write at least one academic essay and undertake multiple group projects. These collective experiences encourage students to imagine history into being through manipulation, integration and creation of products representative of the various intersections and divergences encountered on our journey across Eurasia.

**EN402 British Literature to 1603**
One trimester
Credit: One unit core English credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Three periods per week including lab.

In this course we examine the Anglo-Saxon and Middle-English origins of the English literary tradition and the richness of the English Renaissance. We encounter poems like “The Wanderer” and “The Seafarer,” which blend Christian and pagan elements, and the epic story of *Beowulf* – One of the first great epics in the vernacular literature of the Middle Ages. In fourteenth-century poems like *Sir Gawain and the Green Knight*, we join a medieval knight on his quest for a mysterious green man, and in Chaucer’s *Canterbury Tales* we go on an epic pilgrimage – one that has both spiritual and geographic dimensions – in the company of a group of pilgrims who are on their way to Canterbury. The end of the course deals with the evolution of drama from the medieval morality plays to Elizabethan and early Jacobean plays, with their sometimes transgressive heroes – Christopher Marlowe’s *Dr. Faustus*, and Shakespeare’s *Hamlet* and *Macbeth* come to mind. Grades are based on a variety of essays, including a portfolio essay, and tests.

**EN404 British Literature from 1603 – 1837**
One trimester
Credit: One unit core English credit
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two
trimesters of AS303 or AS305 and permission of the Dean of Humanities. Completion of EN402, EN436, or EN442 is recommended but not required. Meeting pattern: Three periods per week including lab.

This course is an exploration of literature and its cultural contexts, which include Britain’s rise as a modern, maritime, commercial empire. The course spans the period from the reign of James I to the accession of Queen Victoria. It begins with the literary Baroque and with poems and plays by writers like Shakespeare, Ben Jonson, and John Donne, and it concludes with English Romanticism and a redefinition of the mission of the poet and poetry. Writers include figures like Marvell and Lovelace, who wrote from the vantage point of Civil War, revolutionary thinkers and writers like Milton, whose Satan inspired William Blake and Percy Shelley, who believed poets had political as well as aesthetic roles to play. We also encounter gentler voices – those of Romantic writers like Wordsworth and Coleridge – and the somber voices of Keats and the early Tennyson. This period also chronicles the rise of the novel – one of the major achievements of English literary history – and may include works by Daniel Defoe, Jane Austen, Mary Shelley (Frankenstein), and the Brontë sisters. Grades are based on a variety of essays, including a portfolio essay, and tests.

**EN406 British Literature from 1837 to Present**
One trimester  
Credit: One unit core English credit.  
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities. Completion of EN402, EN404, EN436, EN438, or EN444 is recommended but not required. Meeting pattern: Three periods per week including lab.

This course explores British literature in the Age of Empire – and in the wake of the Empire’s decline. Readings may include works by Victorian writers like the later Tennyson and Arnold, as well as Emily Brontë’s Wuthering Heights, Bram Stoker’s Dracula, Sheridan Le Fanu’s Carmilla, and other works that allow us to think about changing perceptions of women, the social world, and the world of Nature. Literary Modernism is a central feature of the course, and readings include works by Joyce, Woolf, D.H. Lawrence, and others. Evelyn Waugh’s Brideshead Revisited is a nostalgic look at the world and the way of life that was lost in two world wars. The course ends with modern poets such as Ted Hughes, Philip Larkin, and others. Grades are based on a variety of essays, including a portfolio essay, and tests.
EN408 East-West Studies II: Ideational and Material Conflicts
One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Four periods per week including lab.

This course explores intersections of East Asian and Western civilizations while simultaneously comparing and contrasting their unique cultural trajectories. We seek to compare and contrast the historical experiences, cultural values and products of civilizations inhabiting opposite extremes of the Eurasian landmass. Given the existence of numerous stereotypes that emphasize divergence, we aim to explore patterns of both similarity and difference. Readings may include excerpts from Arthurian legend, the Tale of the Heike, Yamamoto Tsunetomo’s Hagakure, accounts of chevaliers Marshal and de Charney, Priscus’ account of the Huns, the Secret History of the Mongols, Marco Polo’s Il Milione, Bartolomé de las Casas, accounts of Zheng He, Descartes’ Meditations on First Philosophy, Hobbes’ Leviathan, Zhu Xi, Joseph Needham’s Science in Traditional China, Newton’s Principia Mathematica, les lettres de Madame de Sévigné, Saint-Simon’s Mémoires, selections from Bodin, Voltaire, Rousseau, and Mao, and Conrad’s Heart of Darkness. Students identify and examine myriad sources of conflict in ideological, political, and material realms that exist within and among European and East Asian societies. In pursuit of these goals, students write at least one academic essay and undertake multiple group projects. These collective experiences encourage students to imagine history into being through manipulation, integration, and creation of products representative of the various intersections and divergences encountered on our journey across Eurasia.

EN410 Topics in Literature
One trimester
Credit: One unit core English credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Three periods per week including lab.

This comparative literature course focuses on a selected period, genre, movement, author, or literary theme. Students examine authors and audiences, texts and contexts, and their intellectual milieu. Through
writing a series of commentaries and academic essays, students claim intellectual ownership of what they have learned. Topics for this course rotate. Check with the Registrar to confirm the topic for the coming academic year.

**EN412 Southern Literature and Culture**
One trimester
Credit: One unit core English credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Three periods per week including lab.

This course focuses on Southern literature from the period after the Civil War to the present. Southern writers have produced some of the most important and influential works in our national literature. On our way to understanding what it is that makes a work “Southern” besides a map and a birth certificate, we spend some time in class looking at all aspects of Southern culture and history. From the dance hall to the church fellowship hall, from the tobacco field to the football field, we talk about the traditions and habits that define the people of the American South. Through the work of novelists William Faulkner (*The Sound and the Fury*) and Walker Percy (*The Moviegoer*), short story writers Eudora Welty, Flannery O’Connor, and George Singleton, along with such key poets as Robert Penn Warren, Allen Tate, James Dickey, Everette Maddox, Ellen Bryant Voigt, and Frank Stanford, we discuss the role of place, race, politics, history, and myth in the making of a recognizable and ongoing literary tradition.

**EN416 Asia I: Ethical Structures and Frameworks of Power**
One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Four periods per week including lab.

This interdisciplinary course explores the ancient civilizations and foundational ethical structures of East Asia. Drawing from the fields of archaeology, history, literature, and mythology, students trace the development of early China, Japan, and Korea. Students examine texts from early religious and philosophical traditions, including Buddhism, Confucianism, Daoism, and Shinto. Texts may include early Buddhist sutras, Confucius’ *Analects* and other classics. Laozi’s *Dao de Jing*, T’ang
poetry, Lady Shonagon’s *Pillow Book*, and Lady Murasaki Shikibu’s *Tale of Genji*. The class consists of a creative mix of lectures, discussions, and verbal and written analyses of moving and still images. Students also write a major academic essay on an interdisciplinary topic that is guided and assessed in light of the departmental rubric.

**EN418 Asia II: Dynastic Change amid Le Peril Blanc**

One trimester

Credit: One unit core English credit, one unit core elective credit.

Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.

Meeting pattern: Four periods per week including lab.

This interdisciplinary course draws from the fields of archaeology, history, literature, mythology, theater, and music to trace developments within China, Japan, and Korea. We begin with the Mongol conquests of the thirteenth century and end with social and political restructuring during the nineteenth century. Building on the religions and philosophies studied in *Asia I*, we explore manifestations and adaptations of these ethical foundations in traditional East Asian cultural expressions. A second major topic of *Asia II* examines the different experiences of East Asian societies as they confront internal challenges and Western colonizers. Primary texts may include *Journey to the West*, *Dream of the Red Chamber*, *Outlaws of the Marsh*, Luo Guanzhong’s *Romance of the Three Kingdoms*, the *Tale of the Heike*, Zen parables, Kenko’s *Essays in Idleness*, the *Hagakure* by Yamamoto Tsunetomo, and Basho’s poetry. The class consists of a creative mix of lectures, discussions, and verbal and written analysis of moving and still images. We cultivate opportunities for students to experience East Asian arts, potentially including a tea gathering, calligraphy, haiku, painting, gardening, architecture and other forms of artistic expression. Students also write a major academic essay on an interdisciplinary topic that is guided and assessed in light of the departmental rubric.

**EN420 Asia III: Virtual Asians and the Occidental Gaze**

One trimester

Credit: One unit core English credit, one unit core elective credit.

Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.

Meeting pattern: Four periods per week including lab.
This interdisciplinary course presents a radically changed and dynamic landscape. We start with the upheavals of the early twentieth century, including the world wars and revolutionary restructuring of East Asian politics and societies. We explore the significance of modernism and postmodernism in contemporary Asian cultural expressions with a particular emphasis on the cartoon visions found in manga and anime. Asia III additionally considers the increasing global influence of East Asian cultural products, foreign policy, and political activities during an era of economic growth. Texts may include Kawabata’s *Snow Country*, excerpts from Mishima, manga and anime, writings of Mao Zedong and Deng Xiaoping, CCP propaganda posters, Ai Wei Wei’s art, the film *To Live*, and Kim’s *Lost Names*. The class consists of a creative mix of lectures, discussions, and verbal and written analysis of moving and still images. Students also write a major academic essay on an interdisciplinary topic that is guided and assessed in light of the departmental rubric.

**EN424 Africa I: Pre-Colonial Africa**

*One trimester*

*Credit: One unit core English credit, one unit core elective credit.*

*Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.*

*Meeting pattern: Four periods per week including lab.*

In this course, we reflect on the realities and representations of Africa’s pre-colonial past before the advent of European political domination around 1880. We consider how Africans, Europeans, and the African diaspora have attributed meaning to the place called Africa. We examine how power, trade, and production have intersected with human lives on a global stage. We discuss how humans have tried to make sense of their life situations in relation to Africa and how the diverse peoples of the continent have communicated their particular contexts.

**EN426 Africa II: Modern Africa**

*One trimester*

*Credit: One unit core English credit, one unit core elective credit.*

*Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.*

*Meeting pattern: Four periods per week including lab.*

In this course, we explore Africa’s recent events, predicaments, and accomplishments. We learn how late nineteenth-century colonialism, anti-colonial resistance, nationalism, independence, modernization, post-
colonialism, and neo-colonialism have affected and shaped modern Africa. One way to try to understand the reality of modern Africa is to see multiple aspects of that reality through the eyes of Africans themselves as well as through the eyes of outside observers. We thus turn to writers, scholars, and filmmakers to gain a critical understanding of Africa’s historical and contemporary events and experiences.

EN428 Africa III: Modern North Africa and the Middle East
One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Four periods per week including lab.

This course is an introduction to the cultural, political, social, and economic aspects of modern North Africa and the Middle East, from Napoleon’s Egyptian invasion to the present Syrian crisis. Proceeding chronologically and thematically, we explore a wide range of North African and Middle Eastern self-identities and stories. Together, we think about North Africa’s and the Middle East’s ever-changing relations with sub-Saharan Africa, Asia, Europe, and the Americas. We reflect on the specific collective memories that help varied peoples from Algerian Islamic fundamentalists to Ashkenazi Israeli settlers explain who they are, what they are doing, and where they are going.

EN430: Latin America I: Encounter, Conquest, and Colonialism
One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Four periods per week including lab.

This interdisciplinary course takes a transatlantic approach to the investigation of the native and colonial cultures of Latin America and the Caribbean, from the pre-Columbian era to the early nineteenth century. We examine indigenous civilizations – including those of the Mayans, Aztecs, and Incas – along with the Renaissance backgrounds of the European conquests and the flowering of a new economy of imagination for both Europeans and natives. We investigate the complex world view that produced innovations in cartography and navigation in Europe, as well as the religious and social motivations of Iberian explorers and how their attitudes differed from their English and French counterparts. We
look at the blended culture of the Caribbean and at the nature of slave
culture in Brazil and the Caribbean, along with constructions of color and
understandings of race that differ markedly from those in North America.
Literary works include selections from the Mayan *Popol Vuh*, the chronicles
of European explorers like Christopher Columbus and Bernal Díaz de
Castillo, and writings by Sor Juana Inés de la Cruz.

**EN432 Latin America II: Revolution, Nationhood, and the Search for
Identity and Autonomy**

One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and
American Studies or AS305 American Studies or completion of two
trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Four periods per week including lab.

This interdisciplinary course explores both the quest for independence and
the world after independence, along with the search for authentic
national literatures and national and international identities, among Latin
American and Latino peoples from the early nineteenth-century through
the early twenty-first century. As a part of this effort, we focus extensively
on United States-Latin American relations. Finally, we explore a variety of
works by major Latin American historical and literary figures including José
Martí, Rubén Darío, Pablo Neruda, Gabriel García Marquez, and Isabel
Allende, as well as works by key Latino writers in the United States.

**EN436 Western European Cultural Studies I: Classical and Late Antiquity**

One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and
American Studies or AS305 American Studies or completion of two
trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Two 100-minute evening class meetings.

This class focuses on the weaving of the grand tapestry of the Western
tradition with a focus on the history, political life, literature, architecture,
and art of Classical Greece and Rome. We also venture into the world of
Late Antiquity, which serves as the gateway to the Middle Ages. We
begin with a quest for origins – with Ice Age art and the first portrait of a
woman, which is 40,000 years old –, but we focus on elements of Western
culture that originate in Ancient Greece. These include the concept of
participatory government and unique concepts of individual excellence;
new ideas about the gods and nature; and new modes of expression in
the visual arts, architecture, systematic philosophy, and literature that
celebrate humans and the life they live together in the communities they have engineered. We read plays by Euripides, Plato’s philosophic meditations on the nature of love and the ideal society, Aristotle’s analysis of political communities and the world of nature, and Thucydides’ first attempts to write objective history. We look at the cityscapes envisioned by Alexander the Great and see how they became the model for Augustan Rome. We read epic and pastoral poetry by Virgil as well as the first autobiography, which was written by St. Augustine in the fourth century. We ask questions about the uniqueness of Western man’s continuing fascination with the life of the mind and reason, and we think about why the idea of the individual develops as it does in the West. We explore the development of the art of writing history and ways of thinking about history, literature, and society that extend from Classical Antiquity to the present, and we make connections between long-vanished worlds and our time. Throughout the trimester, students write a number of evidence-based commentaries and essays. In WECS, we use the essay as a tool of thought; we write our way to knowledge.

**EN438 Western European Cultural Studies II: 735 – 1629**

*One trimester*

*Credit: One unit core English credit, one unit core elective credit.*

*Prerequisite:* Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.

*Completion of EN436 or EN442 is recommended but not required.*

*Meeting pattern:* Two 100-minute evening class meetings.

This course begins with the origins of medieval Christendom as a unifying force in the fragmented political order that arose in the wake of Rome’s decline in the West. It continues with medieval histories, literatures, and the development of the first nation states. We trace the gradual recovery of cultural and commercial ties with the Eastern Mediterranean. We witness the recovery of Aristotle’s works from the work of Arab scribes and the incorporation of classical texts in an evolving literary tradition that blends Classical and Christian elements. We explore the twelfth-century Renaissance and the rise of universities, and we encounter philosophic debates over the nature and sources of knowledge. We examine the development of national languages and literatures in France, England, and Italy. We read life-writing by medieval Anchoresses who, by choice, spent their lives in walled enclosures. We read *The Song of Roland; Dante’s Inferno,* and *Purgatorio: accounts of medieval Crusaders and medieval heretics;* letters by Petrarch; political treatises by Marsilius of Padua, Machiavelli, and Thomas Hobbes; documents containing the origins and development of Anglo-American traditions in government and
law; and plays by Shakespeare and Christopher Marlowe. At the end of
the course, we encounter the new phenomenon of self-fashioning in
characters like Dr. Faustus, who barters his soul for knowledge, and in
Hamlet and Macbeth, who find themselves imprisoned in the private
spaces of their minds and their aims. We end the trimester with readings
from Galileo and Hobbes, who point the way toward a demystified,
subjectively constituted world. Throughout the trimester, students write a
number of evidence-based commentaries and essays. In WECS, we use
the essay as a tool of thought; we write our way to knowledge.

**EN440 Western European Cultural Studies III: 1650 to Present**

One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and
American Studies or AS305 American Studies or completion of two
trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Completion of EN436, EN438, EN442, or EN444 is recommended but not
required.
Meeting pattern: Two 100-minute evening class meetings.

This course explores the emergence of the modern world, the modern self,
and the modern state, along with revolutions in politics, literature,
philosophy, and the visual arts. Topics include the emergence of secular
philosophy in Descartes, Hobbes, and Locke; the origins of modern
theories of the social contract in Hobbes, Locke, and Rousseau; and
Romanticism, with its emphasis on the world of feeling. We encounter the
alienating world of industrial culture, and new theories about nature and
history in Marx and Darwin. We examine Modernism in all its forms – in
psychology, in narrative, in the visual arts, in social planning, and in
cinema. We also examine the impact of world wars, globalism, the
newest versions of cultural imperialism, and the modern world’s obsessions
with self and self-revelation. Readings include Rousseau, the English
Romantics, Darwin, Marx, Kierkegaard, Baudelaire, Nietzsche, Heidegger,
Virginia Woolf, and Joseph Conrad, as well as contemporary writers.
Throughout the trimester, students write a number of evidence-based
commentaries and essays. In WECS, we use the essay as a tool of
thought; we write our way to knowledge.

**EN442 Western Civilization: Wisdom, Revelation, Reason & Doubt I (The
Ancient World to the Early Middle Ages)**

One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.

Meeting pattern: Four periods per week including lab.

This interdisciplinary course explores Western societies from the ancient world to the Early Middle Ages. Through examining texts and cultural artifacts, students discuss the history, literature, philosophy, art, and cultures of the ancient Mesopotamians, Hebrews, Greeks, Romans, early Christians, and Europeans of the Middle Ages. Readings include The Epic of Gilgamesh, the Old and New Testaments, Beowulf, and works by Homer, Aristophanes, Thucydides, Plato, Aristotle, Cicero, Virgil, and St. Augustine. Guiding questions for the course include: How have people organized their societies and why? How has religion shaped their lives? How do they define the individual? What are their ethical and moral systems? What is the role of the arts in each culture? What is the relationship between the public and the private spheres? How have people defined themselves in relationship to nature? What are the lasting influences of these societies on the modern world? The course develops students’ skills in writing, critical thinking, research, and public speaking.

EN444 Western Civilization: Wisdom, Revelation, Reason & Doubt II (The High Middle Ages to the Enlightenment)

One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Four periods per week including lab.

This interdisciplinary course explores Western societies from the High Middle Ages to the Enlightenment. Through examining texts and cultural artifacts, students discuss the history, literature, philosophy, art, and culture of the Middle Ages, Renaissance, Reformation, Scientific Revolution, and Enlightenment in Europe. Readings include works by Dante, Chaucer, Machiavelli, Luther, Shakespeare, Galileo, Montaigne, Descartes, Hobbes, Locke, and Voltaire. Guiding questions for the course include: How have people organized their societies and why? How has religion shaped their lives? How do they define the individual? What are their ethical and moral systems? What is the role of the arts in each culture? What is the relationship between the public and the private spheres? How have people defined themselves in relationship to nature? What are the lasting influences of these societies on the modern world? The course develops
EN446 Western Civilization: Wisdom, Revelation, Reason & Doubt III (The Modern World)
One trimester
Credit: One unit core English credit, one unit core elective credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities.
Meeting pattern: Four periods per week including lab.

This interdisciplinary course explores modern Europe from the late eighteenth century to the present. Through examining history, literature, philosophy, art, and culture, students discuss the French Revolution, Romanticism, the Industrial Revolution, Imperialism, Modernism, Communism, Feminism, World Wars I and II, the Cold War, Existentialism, Post-Modernism, Globalization, and the European Union. Readings include works by Rousseau, Mill, Marx, Jane Austen, Tolstoy, Nietzsche, Freud, Sartre, Virginia Woolf, and Tom Stoppard. Guiding questions for the course include: How have people organized their societies and why? How has religion shaped their lives? How do they define the individual? What are their ethical and moral systems? What is the role of the arts in each culture? What is the relationship between the public and the private spheres? How have people defined themselves in relationship to nature? What are the lasting influences of these events and ideas on the world today? The course develops students’ skills in reading, writing, critical thinking, research, and public speaking.

COURSE OFFERINGS: History and Social Sciences

Graduation Requirement in History and Social Sciences
All junior students must complete the three-trimester, interdisciplinary AS303 Writing and American Studies or AS305 American Studies (described under Course Offerings: English), or be exempt. Students who exempt the American Studies requirement must complete four units of core English credit and at least two units of history or social science credit.

SS356 World Religions
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

This course is based on the assumption that religious literacy – knowing about and understanding the subject of religion – is a necessary component of being a global citizen. As Stephen Prothero argues, "Pretending that the world’s religions are the same does not make our world safer. Like all forms of ignorance, it makes our world more dangerous. What we need . . . is a realistic view of where religious rivals clash and where they can cooperate." In this course, we explore the world’s major religions and a few smaller ones, with an eye toward understanding them as dynamic and complex systems that have a significant impact on the world. Through exposure to a variety of texts, research and field trip experiences, we explore the following traditions: Hinduism, Buddhism, Taoism, Sikhism, Jainism, Judaism, Christianity, Islam, and Yoruba. The talents, interests and abilities of every class member will be integral to the teaching and learning in this course.

SS358 International Relations
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab or two evening class meetings.

Patterns of change and continuity characterize international relations in the twenty-first century. For example, city-state interactions in ancient Greece demonstrate similar dynamics to great power relations today, such as the interactions between the United States and China. On the other hand, we also find that new technologies (nuclear and cyber weapons) and shared threats (climate change and terrorism) alter these interactions in sometimes counterintuitive ways. International Relations (IR) introduces the formal study of how countries interrelate, focusing on the broad subject areas of international security and economics. In this course, we learn about the primary actors, their various instruments, and patterns of interactions. Students acquire a conceptual toolbox for framing international issues and events and analyzing their causes and consequences. Major course activities include a group project investigating a contemporary conflict, the application of IR theory to current events, a documentary viewing, and regular discussion of international news.

SS360 Topics in History and Social Science
One trimester
Credit: One unit core elective credit.
Meeting Pattern: Three periods per week including lab.
This course offers students the opportunity for deeper exploration of a particular area of history or social science. The focus varies from year to year. Students increase their knowledge of the subject by reading both primary and secondary sources. Students hone their critical thinking and communications skills by participating actively in seminar-style discussions, by writing academic essays, and by giving class presentations.

SS362 Twentieth-Century Philosophy
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

This is a course on philosophy and its cultural context from the 1840’s to the present. It is also a course on the interplay between philosophy, literature, and the visual arts. We begin in the 1840s and 1850s with figures like Kierkegaard, who is perhaps the first philosopher to articulate the problem of existence and the possibility that life may be meaningless. Kierkegaard’s emphasis on choice and on faith contrasts markedly with Nietzsche’s proclamation of the death of God and his reinterpretation of the concepts of choice and will. We examine the transformations in what Stephen Kern has called the “culture of time and space,” and the changes in views of the physical universe that are reflected in Heidegger’s philosophy of being and time. Later, we examine Adorno and Horkheimer’s analysis of the nihilistic elements in the legacy of the Enlightenment and their critique of the “culture industry,” along with Michel Foucault’s theory of power and Louis Althusser’s theory of the “interpellated” self – the self that is constructed in and through ideology. Toward the end of the course, we discuss postmodern philosophers like Slavoj Žižek, who revisits Marx, reclaims Hegel, and reconsiders theories of ideology and desire. As part of our study, we also read philosophic novels by figures like Dostoevsky, Sartre, and Bernanos. We close with recent works like Judith Butler’s Gender Trouble and the social construction of gender. Classes are organized like seminars and are discussion-based, though there are background lectures that help us organize the materials. Grades are based on a variety of reading commentaries and essays.

SS366 Topics in Psychology
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

Students make an in-depth study of several key topics in the field of psychology. After an introduction to the study of psychology – the origins
of the discipline, basic theories and terminology, and research methodologies – students explore special topics which may include abnormal psychology (the history of this area of study, the range of diagnoses in our society today, and current treatment options); medical psychology (psychological conditions that result in illness or death); the psychology of employment and economic class (the effects of work and income levels on mental functions and behavior); the psychology of deviance (how definitions of the term have changed over time; the individual and societal costs of deviance; the origins of deviance and the societal measures used to cope with it); the psychology of the family; and the psychology of advertising. Activities and assessments include readings, lectures, discussions, videos, quizzes, tests, essays, and projects.

**SS368 Sociology**  
*One trimester*  
*Credits:* One unit core elective credit.  
*Meeting pattern:* Four periods per week.

In this course, students gain an understanding of the phenomenon we call "society." Students explore the impact of society on the individual, the various levels of power and inequality in society, and the roles of groups, organizations, and multinational corporations. We discuss the various stages of social change over the course of history, beginning with a discussion of sociological theories and research methods. Often, the theoretical and methodological basis for the assertions in our readings may appear to be "common sense," but through a detailed examination, we find that this is not the case. According to Berger, "The first wisdom of sociology is this – things are not what they seem. This, too, is a deceptively simple statement. It ceases to be simple after a while. Social reality turns out to have many layers." We explore the forces that influence us, and thus examine our conception of the world around us: the taken-for-granted reality and all its implications.

**SS370 Islamic Civilization**  
*One trimester*  
*Credits:* One unit core elective credit.  
*Meeting pattern:* Three periods per week including lab.

William H. McNeill has written, “The rise of Islam offers perhaps the most impressive example in world history of the power of words to alter human behavior in sudden, surprising ways.” This course invites students to journey into the remarkable story of a civilization that began with just one word – "Recite!" – heard by the Prophet Muhammad in a dusty Arabian cave in 610 CE. Our travels take us from Mecca across the globe, as we
visit the vibrant, diverse cultural regions collectively known as the “Islamic World,” where Islam has been the predominant religion since its expansion in the eighth century CE. Using an interdisciplinary approach incorporating the fields of religion, science, mathematics, art history, pop culture, and anthropology, we examine the development of the religion and the spread of empire, including the achievements of the Golden Age from “A to Q” – that is, from algebra to the Qu’ran. Other topics include divergences within Islam, popular faith and practice, global Islamic movements, and recent political developments.

**SS402 AP Microeconomics**

*One trimester*

*Credit:* One unit core elective credit.

*Meeting pattern:* Three periods per week including lab or two evening class meetings.

This course offers students an opportunity for immersion in a fascinating discipline and in logical thinking. This immersive process involves not only an introduction to general economic theory and more specific microeconomic theory but also investigations into the essence of the discipline itself. Students pursue this topic through case studies or strategic problems involving pricing issues in product markets, various market structures, and industrial and social regulation within both historic and contemporary environments. We also address the business of inequality, poverty, and discrimination – again within both historic and contemporary environments. Thus, the curriculum content and processes of analyses are organized around holistic, ill-structured, real-world “problems,” simulations, and case studies. These experiences are designed to be of an integrated and multi-layered nature and provide opportunities to discover and apply the microeconomics concepts from our readings and discussions. In taking this consciously constructivist approach, we integrate other disciplines into the study of microeconomics. Elements from the fields of psychology, history, political science, and mathematics all have roles to play as we propose resolutions to our microeconomic problems, case studies, and simulations.

**SS404 AP Macroeconomics**

*One trimester*

*Credit:* One unit core elective credit.

*Meeting pattern:* Three periods per week including lab or two evening class meetings.

This course offers an opportunity for immersion in a fascinating discipline and in logical thinking. This immersive process involves not only
macroeconomic theory but investigations into the essence of the discipline itself through case studies or strategic problems involving global commodity price movements, designing simulated national macroeconomic policies for a globalized marketplace environment, and prognostication studies of sustainability. The basic theoretical structures of macroeconomics, as found in our readings and discussions, are woven through these three experiences during the course. These experiences are researched within the context of a trimester-long problem in the simulated trading of financial instruments and strategic commodities in our paratrade environment. This longer, overarching problem allows us the opportunity to apply recently acquired macroeconomic theory to a simulated real-world environment.

**SS406 AP Psychology (I)**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Four periods per week.*

This course introduces students to the systematic and scientific study of the behavior and mental processes of human beings. Students learn about some of the explorations and discoveries made by psychologists over the past century. Students also assess some of the differing approaches adopted by psychologists; including the biological, behavioral, cognitive, humanistic, psychodynamic, and socio-cultural perspectives. Students also come to an appreciation of the kind of critical analysis that psychologists espouse and model in their work.

**SS410 AP Psychology (II)**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: B or higher grade in SS406 AP Psychology (I).*

*Meeting pattern: Four periods per week.*

This course provides students with an intense preparation for the AP Examination through review of the material covered in the first term. Students work collaboratively with their peers to engage in teaching one another course material – a proven study strategy. Following the exam, students enjoy the opportunity to embark on research on a psychology-related topic of their choice.

**SS411a /SS411b AP European History**

*Two trimesters*

*Credit: Two units core elective credit.*
Prerequisite: B or higher grade in AS303 Writing and American Studies or AS305 American Studies or permission of Dean of Humanities.
Meeting pattern: Three periods per week including lab.

This survey course examines major topics, trends, and events in European history from 1450 to the present. Students analyze a variety of primary sources, print and non-print, as well as interpretive works by modern historians. Emphasis is placed on developing research, writing, and analytical skills in preparation for the AP European History Examination. Special consideration is given to how and why people – both individuals and groups – in different historical contexts actively shaped their lives, beliefs, and identities.

SS412 Environmental Economic Systems: Buddha, Marx, Elvis, and the Wolves
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab or two evening class meetings.

This course investigates the dynamics of the contemporary global market system in both a theoretical and an historical context and as such seeks to understand the implications of a growth-oriented economic structure for a finite environment. We seek this understanding through an investigation into “Buddhist Economics,” or the concept of limiting growth by limiting desires; we look into the origins of obsessive growth with the concept of primitive accumulation as described by Marx in Das Kapital; likewise, we explore the symbiotic relationship between consumer culture and popular culture that seems to accelerate our economic growth rate as pop culture icons like Elvis become a stimulus for consumption; and finally we try to understand the impact of unlimited economic growth through the experiences of the wolves of Japan and North America. This is done through three case studies or strategic problems involving a comparison of neo-classical economic theory and alternative economic systems, the economics of ecology, and the economics of popular culture. Thus, the course can serve both as an introduction to the study of economic applications to contemporary real-world problems and a continued investigation into economic theory and philosophy.

COURSE OFFERINGS: Music
Music Instruction, Theory, and Production

MS306, MS308, and MS310 Jazz Performance Workshop
One trimester
Credit: One unit each additional elective credit.
Meeting Pattern: Three periods per week.

This course is a comprehensive study of jazz music and theory. Students focus on the study of jazz literature, jazz styles, and improvisational skills. Largely self-paced, this course provides students the opportunity to learn jazz literature, theory, and performance practice. Students learn jazz technique, note reading, chords, harmony, rhythm, and style. The course includes written music theory assignments, assigned songs to learn and perform for the instructor, and in-class performances with public performances scheduled as appropriate. Students of all levels and experience are eligible. Repeatable for credit.

MS312, MS314, MS316 Classical Piano and Guitar Theory and Practice
One trimester
Credit: One unit each additional elective credit.
Meeting pattern: Three periods per week.

This course is a comprehensive study of instrumental music and theory through the idioms of piano and guitar. Largely self-paced, this course provides students the opportunity to learn the music literature and performance practice of guitar or piano. Students learn playing technique, note reading, chords, harmony, rhythm, and pitch. Students may choose guitar or piano as their primary instrument. The course includes written music theory assignments, assigned songs to learn and perform for the instructor, a trimester examination, and in-class performances. There is no prerequisite for this course. Students of all levels and experience are eligible. Repeatable for credit.

MS322 Music Theory and Composition
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Three periods per week.

This course provides an understanding of classical and contemporary trends in music composition. Students learn fundamental music theory concepts while utilizing the latest in music notation technology. Students explore songwriting and music composition for various instruments. After developing basic skills and concepts, students analyze and recognize
contemporary trends in music composition and compose and arrange their own music.

**MS336 Audio and Digital Music Production**  
*One trimester*  
*Credit: One unit additional elective credit.*  
*Meeting pattern: Three periods per week including lab.*

This course employs “hands-on” discovery of concepts in music production in the digital realm, focusing on concepts in acoustics, creativity, and music production. Topics include: principles of acoustics, microphones, microphone techniques, digital recording, mixing consoles and mixing theory, production, effects and dynamics processing, stereo and multi-track editing, step sequencing, and open source software applications. Each student completes multiple recording, sequencing, and editing projects throughout the trimester.

**MS364 Advanced Audio Recording Technology**  
*One trimester*  
*Credit: One unit additional elective credit.*  
*Prerequisite: MS336 Audio and Digital Music Production.*  
*Meeting pattern: Three periods per week.*

This course is a continuation of MS332 Audio Recording Technology and of MS334 Digital Music Production. This course includes advanced topics such as multi-track digital editing, advanced mixing theory, a variety of recording sessions, and live sound support. Students are expected to complete a major recording project during the course of the trimester.

**MS402 AP Music Theory**  
*One trimester*  
*Credit: One unit additional elective credit.*  
*Prerequisite: MS322 Music Theory and Composition.*  
*Meeting pattern: Three periods per week including lab.*

This course is a continuation of MS322 Music Theory and Composition with an emphasis on preparation for the AP Music Theory exam. Major concepts include musical terminology, analysis, ear training, four-part voice writing, and musical forms.

**Musical Performance**  
The NCSSM performing ensembles are dedicated to the teaching, performance, study, and cultivation of ensemble music and literature of the highest quality. These performing ensembles are a serious and
distinctive medium of musical expression, of vital service and importance to its members and to NCSSM. Through exemplary practices in organization, training, and presentation, these ensembles provide effective experiences in musical performance and in music culture for its members. The NCSSM performing ensembles seek to offer outstanding performances each trimester and to enhance the institutional spirit and character of NCSSM. To music as an art and experience, the NCSSM performing ensembles bring increasing artistry, understanding, and respect by efforts within our own immediate sphere and by providing leadership through cooperation with other musical ensembles pursuing similar musical goals. Members of NCSSM performing ensembles are encouraged to audition for regional, state, and national honors ensembles, including all NCMEA-, NAfME-, and ASTA-sponsored events.

MU302, MU304, MU306 Chorale
One trimester each
Credit: One unit each additional elective credit.
Prerequisite: Previous musical experience in chorus, band, orchestra, voice, or piano.
Meeting pattern: Two evening class meetings. Some scheduled weekend rehearsals and weekend concerts.

The Chorale is a vocal ensemble that studies and performs a variety of standard choral literature. This ensemble performs masterworks of choral literature in collaboration annually with other NCSSM musical ensembles. Concepts emphasized include ensemble techniques, vocal production, solfeggio, note reading, and other aspects of choral music. Interested students are encouraged to register for all three trimesters of this course. Repeatable for credit.

MU314, MU316, MU318 Wind Ensemble
One trimester each
Credit: One unit each additional elective credit.
Prerequisite: Previous musical experience on woodwind, brass, or percussion instruments.
Meeting pattern: Two periods per week including lab plus one evening class meeting. Some scheduled weekend rehearsals and weekend concerts.

Wind Ensemble is an advanced wind band with an emphasis on standard wind band music literature and wind chamber music. Concepts emphasized include tone production, ensemble intonation, performance technique, and musical interpretation. Students interested in symphony orchestra literature are selected by audition to rehearse and perform with
the NCSSM Orchestra on a regular basis. Interested students are encouraged to register for all three trimesters of this course. Repeatable for credit.

**MU332, MU334, MU336 Orchestra**

*One trimester each*

**Credit:** One unit each additional elective credit.

**Prerequisite:** Previous musical experience on a string instrument.

**Meeting pattern:** Two periods per week including lab plus one evening class meeting. Some scheduled weekend rehearsals and weekend concerts.

The NCSSM Orchestra is a string orchestra with an emphasis on masterpieces of string and symphony orchestra music literature. Concepts emphasized include performance technique, tone production, ensemble intonation, musical interpretation, and advanced string technique. Winds and percussion are added to the string section from the Wind Ensemble as required by the literature selected for performance. Interested students are encouraged to register for all three trimesters of this course. Repeatable for credit.

**COURSE OFFERINGS: World Languages**

**WORLD LANGUAGES**

To know a language is to know a culture. There is no better way to gain insight into the myriad cultures of the world than to learn the language of the culture of interest. We invite students to begin the study of a new language or to continue and deepen the understanding of one that they have already begun.

**Graduation Requirement in World Language**

To meet the graduation requirement in world languages, students must complete the intermediate level or higher of a language at NCSSM. Students who wish to enroll in the intermediate level or higher of French or Spanish in the junior year are required to take a placement test in that language prior to enrolling in the course. Placement for the intermediate level or higher of Chinese is based upon an intake form, a placement assessment, and the student’s previous study in Chinese. Placement in Japanese, or Latin is based upon an intake form and the student’s previous study of the language. Students who begin a new language in the junior year must continue that language in the senior year, regardless of prior world language credits. Each student must complete three units of world language during the junior year. See page 130 for conditions and options for exemption.
**CN305a/CN305b/CN305c Introductory Chinese**  
One year  
Credit: Three units core World Language credit.  
Meeting pattern: Four periods per week.

Introductory Chinese is designed for those who have never spoken or studied the language and for non-native Mandarin speakers with up to one year of previous study in the language. This course provides students with the fundamentals for learning to understand, speak, and begin to read and write Mandarin Chinese. The course focuses on developing accurate pronunciation and tones, learning to understand the spoken language in context, and developing a foundation of basic sentence patterns, questions, and everyday vocabulary. The sound system (pinyin and tones) and the writing system (radicals and stroke order) are presented in detail. Reading is used to support and reinforce the acquisition of the spoken language. The course is proficiency-based and focus is on the development of listening and speaking skills. Class is conducted entirely in Chinese by the third trimester.

**CN307a/CN307b/CN307c Intermediate Chinese**  
One year  
Credit: Three units core World Language credit.  
Prerequisite: CN305 Introductory Chinese or equivalent, or permission of the Dean of Humanities.  
Meeting pattern: Four periods per week including lab.

Intermediate Chinese is designed for students who are able to carry out basic conversations in Mandarin about everyday topics. Students are expected to have mastery of pinyin and stroke order. The focus continues to be on the development of listening and speaking skills, with the specific goals of expanding vocabulary and exposing students to more complex sentence patterns. There is an additional focus on word/character analysis and reading strategies, composition skills, and cultural understanding. The course is proficiency-based, and class is conducted entirely in Chinese. A special feature of the course is a weekly shared virtual classroom with a high school in China. Students thus have the opportunity to engage in educational and cultural exchange with their counterparts in China.

**CN354 Advanced Chinese I**  
**CN356 Advanced Chinese II**  
**CN358 Advanced Chinese III**  
One trimester each
Credit: One unit each World Language credit. Junior students using this sequence to meet the World Language graduation requirement must complete all three one-trimester courses. Seniors who have completed CN307 and are taking this course for core-elective credit may choose to take only one or two trimesters, if they wish. Prerequisite: CN307 Intermediate Chinese or equivalent, or permission of the Dean of Humanities, is prerequisite for CN354. Then, each course in the sequence, or permission of the Dean of Humanities, is prerequisite for the next course. Meeting pattern: Four periods per week.

Advanced Chinese is designed for students who grew up hearing or speaking Mandarin, or who have attended three or more years of weekend Chinese school. Advanced Chinese students are able to comfortably carry on extended conversations in Mandarin about everyday topics. The primary focus of the course is on expanding students’ reading ability. Selected vocabulary and sentence patterns are introduced in order to support students’ discussion of a broader range of topics in a more formal manner. Reading and writing are used to reinforce new language skills and explore cultural understanding. The course is proficiency-based. The primary focus is on reading with a continued emphasis on expanding listening and speaking skills.

**CN404 Readings in Chinese with Topics I**  
**CN406 Readings in Chinese with Topics II**  
**CN408 Readings in Chinese with Topics III**  
One trimester each  
Credit: One unit each of World Language credit.  
Unless exempt, junior students using this sequence to meet the World Language graduation requirement must complete all three one-trimester courses. Junior students who have exempted the World Language requirement and seniors taking this course for core-elective credit may choose to take only one or two trimesters, if they wish. Prerequisite: CN358 Advanced Chinese or equivalent, or permission of the Dean of Humanities, is prerequisite for CN404. Then, each course in the sequence, or permission of the Dean of Humanities, is prerequisite for the next course. Meeting pattern: Four periods per week.

Readings in Chinese is designed for students who are able to converse in Mandarin in more extended and complex ways: they are able to compare and contrast and are also able to persuade. They can explain in detail and narrate fully and accurately in all time frames. Students develop and expand their ability to make formal presentations. Students
also read authentic materials, including articles and essays, on a variety of topics related to Chinese culture and history. The basics of Classical Chinese are introduced and students improve their composition skills through regular writing assignments. Students deepen their cross-cultural communication skills by continuing to observe and compare cultural differences and similarities between China and the west. The course is proficiency-based, and conducted entirely in Chinese.

**FR305a/FR305b/FR305c Introductory French**  
*One year*  
*Credit:* Three units core World Language credit.  
*Meeting pattern:* Four periods per week.

This first-year course emphasizes the acquisition of basic language skills: speaking, listening, comprehension, reading, and writing. Students acquire a base vocabulary and learn the simple grammatical constructions needed for essential communication. Students also explore the varied cultures of French-speaking peoples throughout the world. Web-based exercises, the language lab, videos, and songs aid students in their acquisition of grammatical concepts, new vocabulary, and listening skills.

**FR307a/FR307b/FR307c Intermediate French**  
*One year*  
*Credit:* Three units core World Language credit.  
*Prerequisite:* Completion of FR305 Introductory French or equivalent, or permission of the Dean of Humanities.  
*Meeting pattern:* Four periods per week.

In this accelerated second-year course students continue to develop their proficiency in French and explore francophone cultures in the world. While emphasis on basic language skills and grammatical construction is continued, students learn to speak and write about self, family, friends, and everyday activities in the past, conditional, and future tenses. Reading short texts, viewing video programs, and using the language in everyday conversational situations further increase students’ proficiency in the language. Web-based exercises, the language lab, videos, and songs aid students in their acquisition of grammatical concepts, new vocabulary, and listening skills.

**FR354 Advanced French I**  
**FR356 Advanced French II**  
**FR358 Advanced French III**  
*One trimester each*
Credit: One unit each world language credit. Unless exempt, junior students using this sequence to meet the World Language graduation requirement must complete all three one-trimester courses. Junior students who have exempted the World Language requirement and seniors taking this for core-elective credit may choose to take only one or two trimesters, if they wish.

Prerequisite: FR307 Intermediate French or equivalent, or permission of the Dean of Humanities, is prerequisite for FR354. Then, each course in the sequence, or permission of the Dean of Humanities, is prerequisite for the next course.

Meeting pattern: Three periods per week including lab.

These three one-trimester courses constitute a third-year level of French study which emphasizes the importance of French as a language of the arts, literature, and philosophy. The courses are conducted entirely in French and students are encouraged to use French in all their classroom interactions. More advanced grammatical concepts are learned that build on structures studied in FR307 Intermediate French. More emphasis is placed upon reading excerpts from literary and journalistic texts as well as writing short compositions about them. A large part of the course is dedicated to reading and studying Antoine de Saint-Exupery’s novel Le Petit Prince. Web-based exercises, the language lab, videos, and songs aid students in their acquisition of grammatical concepts, new vocabulary, and listening skills.

FR404 Modern French Readings and Media I
FR406 Modern French Readings and Media II
FR408 Modern French Readings and Media III

One trimester each
Credit: One unit each World Language credit. Unless exempt, junior students using this sequence to meet the World Language graduation requirement must complete all three one-trimester courses. Junior students who have exempted the World Language requirement and seniors taking this for core-elective credit may choose to take only one or two trimesters, if they wish.

Prerequisite: FR358 Advanced French III or equivalent, or permission of the Dean of Humanities, is prerequisite for FR404. Then, each course in the sequence, or permission of the Dean of Humanities, is prerequisite for the next course.

Meeting pattern: Three periods per week including lab.

Another important aspect of French is its major influence for modernist and post-modernist thought in the world, as we will discover in this three-trimester sequence, which constitutes a fourth-year study of French and is
most suitable for students who have completed the equivalent of three or more years of high school French. In these courses, students read, analyze, and discuss in French short stories, plays, poetry, and essays in conjunction with fine arts, film, TV, and advertising. Emphasis is on gaining a deeper understanding of modern French and francophone culture and civilization. Popular currents such as symbolism, surrealism, and existentialism that have shaped modern thought and philosophy are examined through different artistic media, allowing students to pursue personal interests. Each trimester, students visit a local museum, theater production, or film, depending on available exhibitions and shows. Previously-studied grammatical structures are reviewed, and more advanced grammar is introduced organically as it appears in the readings. Students sharpen all four language skills: listening, speaking, reading, and writing.

**JA305a/JA305b/JA305c Introductory Japanese**  
One year  
Credit: Three units core World Language credit.  
Meeting pattern: Four periods per week.

Emphasis in this first-year course is placed on the acquisition of basic language skills: speaking, listening, comprehension, reading, and writing. Students acquire a base vocabulary and learn the simple grammatical constructions needed for essential communication. Cultural aspects of Japan are also introduced.

**JA307a/JA307b/JA307c Intermediate Japanese**  
One year  
Credit: Three units core World Language credit.  
Prerequisite: JA305 Introductory Japanese or equivalent, or permission of the Dean of Humanities.  
Meeting pattern: Four periods per week.

In this course, students continue their journey into Japanese language and culture. Emphasis on basic language skills and grammatical construction is continued. Students’ proficiency in the language is further increased by reading short texts, viewing video programs, and using the language in everyday conversational situations. Most of the grammatical constructions are learned.

**LA305a/LA305b/LA305c Introductory Latin**  
One year  
Credit: Three units core World Language credit.  
Meeting pattern: Three periods per week including lab.
Verbs and nouns, as they are conjugated or declined in hundreds of distinct forms, are the central focus of this course. We see how grammatical order enables verbs and nouns to make up sentences, with the help of pronouns, adverbs, adjectives, prepositions, and conjunctions. We develop both analytical skill in paying attention to details and synthetical skill in remembering many basic forms together. We recite daily, learn roots of modern works, diagram and translate Latin sentences, and discover aspects of Roman culture.

**LA307a/LA307b/LA307c Intermediate Latin**
One year
Credit: Three units core World Language credit.
Prerequisite: LA305 Introductory Latin or equivalent, or permission of the Dean of Humanities.
Meeting pattern: Three periods per week including lab.

Julius Caesar's *Commentaries on the Gallic War* have schooled second-year Latin students for centuries, and now we too join these students. During the first half of our year, as preparation for reading Caesar, we submit to rigorous boot camp in studying adjectives and adverbs in their three degrees, infinitives, indirect statements, participles, ablative absolutes, gerundives, gerunds, deponents, locatives, and irregular verbs. We learn the subjunctive mood as we study Caesar's use of it as he writes about his adventures in Gaul.

**LA404 Advanced Latin Poetry I**
**LA406 Advanced Latin Poetry II**
**LA408 Advanced Latin Poetry III**
One trimester each
Credit: One unit each World Language credit.
Unless exempt, junior students using this sequence to meet the World Language graduation requirement must complete all three one-trimester courses. Junior students who have exempted the World Language requirement and seniors taking this for core-elective credit may choose to take only one or two trimesters, if they wish.
Prerequisite: LA307 Intermediate Latin or equivalent, or permission of the Dean of Humanities, is prerequisite for LA404. Then, each course in the sequence, or permission of the Dean of Humanities, is prerequisite for the next course.
Meeting pattern: Three periods per week including lab.

A reward for having studied Latin during two or more rigorous years is the delight of reading Ovid, Catullus, and Horace in the original Latin. Brilliant,
witty, and humane Ovid preserved ancient oral tradition in his rhythmic written lines, inspiring Shakespeare and others for centuries. Catullus composed short songs, lyrical in love; as he both hated and loved at the same time, his work is comparable to some songs of today. Horace sacrificed frivolity, dedicating himself to his Sabine farm and returning to the springing waters of inspiration.

LA410 Advanced Latin Prose I
LA412 Advanced Latin Prose II
LA414 Advanced Latin Prose III
One trimester each
Credit: One unit each World Language credit.
Unless exempt, junior students using this sequence to meet the World Language graduation requirement must complete all three one-trimester courses. Junior students who have exempted the World Language requirement and seniors taking this for core-elective credit may choose to take only one or two trimesters, if they wish.
Prerequisite: LA307 Intermediate Latin or equivalent, or permission of the Dean of Humanities, is prerequisite for LA410. Then, each course in the sequence, or permission of the Dean of Humanities, is prerequisite for the next course.
Meeting pattern: Three periods per week including lab.

A reward for having studied Latin during two or more rigorous years is the delight of reading Caesar, Sallust, and Cicero in the original Latin. We are in Britain as Caesar passes below the cliffs of Dover, discovers ocean tides, loses ships in a hurricane, and heartens his cold, stranded Roman soldiers who fight bravely on. Then we are in Rome, hearing Sallust tell how Catiline's conspiracy is threatening the republic. Cicero the consul, wears a metal breastplate under his clothing to save his life, and he attacks Catiline with elegant passionate speeches before the Senate. A small, dark, stark prison shows Roman power at its worst.

NOTE: The LA404/406/408 sequence and the LA410/412/414 sequence are offered in alternate years. Neither sequence is prerequisite for the other. Junior students with the requisite ability may take whichever sequence is offered that year. Then, as seniors, students may take the other sequence, rounding out a two-year sequence in advanced Latin.

SP305a/SP305b/SP305c Introductory Spanish
One year
Credit: Three units core World Language credit.
Meeting pattern: Four periods per week.
Student embark on a journey of linguistic and cultural exploration as they take the first steps towards becoming proficient in Spanish. This course is for students who have not studied Spanish before or who have not yet completed a full year of introductory Spanish study in high school. Students learn to negotiate meaning among individuals, interpret written and spoken meaning, and to present meaning via oral and written messages that focus on the themes of self, family, friends, and everyday activities in the present tense. Students also learn to address the same themes within a limited introduction to the past tense. Cultural aspects of the Spanish-speaking world are interwoven throughout the course. Web-based exercises, the language lab, videos, and songs aid students in their acquisition of grammatical concepts, new vocabulary, and listening skills.

**SP307a/SP307b/SP307c Intermediate Spanish**

One year
Credit: Three units core World Language credit.
Prerequisite: SP305 Introductory Spanish or equivalent, or permission of the Dean of Humanities.
Meeting pattern: Four periods per week.

The intermediate level of language study offers its own unique rewards, such as the ability to begin to read short stories and narratives, as well as the opportunity to enjoy and comprehend a wider array of media produced in Spanish. Students also begin to develop an appreciation for the nuances of the language. This is an accelerated second-year Spanish course designed for students who have had a full year of introductory Spanish study in high school or equivalent exposure to the language. Students learn to negotiate meaning among individuals, interpret written and spoken meaning, and to present meaning via oral and written messages primarily in the past tense. Reading short texts, viewing video programs, and using the language in everyday conversational situations further increases students’ proficiency in the language. Most of the basic grammatical constructions are learned. Exploration of cultural aspects of the Spanish-speaking world is continued. Web-based exercises, the language lab, videos, and songs aid students in their acquisition of grammatical concepts, new vocabulary, and listening skills.

**SP354 Advanced Spanish I**
**SP356 Advanced Spanish II**
**SP358 Advanced Spanish III**

One trimester each
Credit: One unit each World Language credit.

Unless exempt, junior students using this sequence to meet the World Language graduation requirement must complete all three one-trimester
courses. Junior students who have exempted the World Language requirement and seniors taking this for core-elective credit may choose to take only one or two trimesters, if they wish.

Prerequisite: SP307 Intermediate Spanish or equivalent, or permission of the Dean of Humanities, is prerequisite for SP354. Then, each course in the sequence, or permission of the Dean of Humanities, is prerequisite for the next course.

Meeting pattern: Four periods per week.

In Advanced Spanish, the journey into language continues but expands to encompass elements that reflect the breadth and depth of the Spanish-speaking world and its cultures. In these three one-trimester courses, which constitute a third-year level of Spanish study, students explore the culture, history, society, and literature of various Spanish-speaking peoples as they continue to acquire proficiency in the language. Through a rich program of original short films, audio activities, cultural readings, and authentic literary selections, students improve their understanding of spoken Spanish and develop their speaking, reading, and writing abilities. Classroom activities emphasize communication, allowing students to interact and apply what they are learning. An accompanying web-based program provides additional language exercises. The course content is theme-focused and speaks to current as well as perennial issues, such as family, society, and the natural world and its protection. These topics inform class discussions and debates, and serve as the basis for writing in Spanish.

SP404 Readings in Spanish with Topics I
SP406 Readings in Spanish with Topics II
SP408 Readings in Spanish with Topics III

One trimester each
Credit: One unit each World Language credit.

Unless exempt, junior students using this sequence to meet the World Language graduation requirement must complete all three one-trimester courses. Junior students who have exempted the World Language requirement and seniors taking this for core-elective credit may choose to take only one or two trimesters, if they wish.

Prerequisite: SP358 Advanced Spanish III or equivalent, or permission of the Dean of Humanities, is prerequisite for SP404. Then, each course in the sequence, or permission of the Dean of Humanities, is prerequisite for the next course.

Meeting pattern: Three periods per week including lab.

These courses allow students to synthesize language, ideas and culture in new and rich ways. Conducted entirely in Spanish, these three one-
trimester courses constitute a fourth-year level of Spanish study and are designed to serve as a bridge between language study and literature. The courses are an exploration of literature, culture, and society through a variety of genres, including brief narratives, excerpts, short stories, poetry, plays, non-literary selections, and the arts. Students develop an advanced vocabulary and improved reading comprehension. They discuss and write about the issues and themes presented in the readings as they explore different points-of-view and forms of creative expression. Students are invited to participate in the creative process by transforming their responses to assigned readings into drawings, paintings, and collages. Students develop their writing skills in personal and descriptive narratives as well as essays that compare and contrast or persuade. They learn to edit their writing through peer editing, by using an editing key, and through re-writes. Students review grammatical structures and make oral presentations.

SP454 Advanced Readings in Spanish with Topics I
SP456 Advanced Readings in Spanish with Topics II
SP458 Advanced Readings in Spanish with Topics III
One trimester each
Credit: One unit each World Language credit.
Unless exempt, junior students using this sequence to meet the World Language graduation requirement must complete all three one-trimester courses. Junior students who have exempted the World Language requirement and seniors taking this for core-elective credit may choose to take only one or two trimesters, if they wish.
Prerequisite: SP408 Readings in Spanish with Topics III or equivalent, or permission of the Dean of Humanities, is prerequisite for SP454. Then, each course in the sequence, or permission of the Dean of Humanities, is prerequisite for the next course.
Meeting pattern: Three periods per week including lab.

Literature in Spanish encompasses writers from Latin America, Spain, and the United States. Reading this literature opens a window into the minds of Spanish-speaking peoples and their cultures. In this course, we invite students to explore this fascinating world and to experience the richness, depth, and variety of its literary expression. Our knowledge of the language prepares us to better appreciate some of the great contributions to world literature, both modern and classical, by writers from all corners of the Spanish-speaking world. Conducted entirely in Spanish, these three one-trimester courses are designed for students with a particularly strong background in Spanish language, reading, and writing. Students explore topics in literature and culture that are beyond the standard curriculum. They read from a variety of genres such as the
short story, poetry, plays, essays, and the novel as well as articles related to topics ranging from the practical to the abstract. They develop intensive reading strategies and a more advanced vocabulary, and they write persuasive essays that defend a thesis. Students continue to review advanced grammatical topics and continue to develop their discussion skills in Spanish. Students make oral presentations in Spanish and complete a paper or independent project in Spanish on a topic of interest.

DEPARTMENT of MATHEMATICS
The Department of Mathematics at the North Carolina School of Science and Mathematics offers students the opportunity to build a solid understanding in mathematics through foundation courses that focus on concepts, applications, and the use of technology. Following these courses, students may continue their studies in advanced courses or sponsored research that expand the breadth and depth of their understanding and help them to recognize the many uses of mathematics in other areas of study.

Graduation Requirement in Mathematics
Each student must successfully complete five units of core mathematics for graduation credit. Unless a student is placed in a higher level of mathematics upon entry to NCSSM, three units must be in MA305 Precalculus and Modeling or MA355 Precalculus and Modeling with Advanced Topics. All students are required to purchase a graphing calculator. Specific information concerning the type of calculator is provided at the time of course registration.

Placement
Junior students are placed in the course best suited for them as determined by the Mathematics Department based on placement tests, previous instruction, and interviews. Placement of senior students is determined by their performance in the mathematics courses they complete as juniors. The department recognizes the individual differences that need to be considered as students are placed in senior level courses.

MA301a/MA301b/MA301c Algebra 3
One year
Credit: Three units core mathematics credit.
Meeting pattern: Four periods per week including lab.

This course builds upon and enriches content typically taught in Algebra 2 and gives students an opportunity to develop algebraic skills for solving real-world problems. Topics covered include data analysis, introduction
to functions and their graphs (linear, quadratic, exponential, and logarithmic functions), solutions to equations and inequalities, solutions to systems of equations, recursive equations, matrix algebra, and elementary trigonometry. Emphasis is placed on using mathematics as a tool for problem solving and simple mathematical modeling.

NOTE: Students who place into MA301 Algebra 3 are not permitted to take both chemistry and physics in the junior year. Rather, these students may take chemistry and biology courses or physics and biology courses to meet the junior year science requirement.

**MA305a/MA305b/MA305c Precalculus and Modeling**
One year  
Credit: Three units core mathematics credit.  
Prerequisite: MA301 Algebra 3, or Algebra 2 and adequate score on the mathematics placement test.  
Meeting pattern: Four periods per week including lab.

This course is devoted to developing a toolkit of functions that serves as a bridge between mathematics and the world it models. The toolkit includes explicitly defined functions such as exponential, polynomial, logarithmic, and trigonometric functions, as well as functions that are defined recursively and parametrically. Students investigate functions, bivariate data, and models with graphing calculators and computers. Both graphical and analytical approaches to problem solving are emphasized. Students also complete lab activities and present their results in formal written reports.

**MA355a/MA355b/MA355c Precalculus and Modeling with Advanced Topics**
One year  
Credit: Three units core mathematics credit.  
Prerequisite: MA301 Algebra 3 and permission of the Dean of Mathematics, or Algebra 2 and adequate score on the mathematics placement test.  
Meeting pattern: Four periods per week including lab.

The topics and ideas of MA305 Precalculus and Modeling are presented in greater depth and at a faster pace. Some topics are explored more extensively, and additional topics are selected to supplement the course materials. Students are expected to work more independently than they would in MA305.
MA368 Finite Mathematics
One trimester
Credit: One unit core mathematics or core elective credit.
Prerequisite: At least two trimesters of MA305 Precalculus and Modeling.
Meeting pattern: Four periods per week.

This course offers an overview of many applications of mathematics, especially in the social and management sciences. Topics covered include a selection of the following: fair division of resources and costs, voting methods, apportionment of legislative bodies, power of voting coalitions, finance, probability with Markov chains, linear programming, game theory, and mathematical models using matrices. Students are expected to be involved in formulating problems, applying the appropriate mathematics to find a solution, and evaluating the solution. Computers and calculators are incorporated as computational and modeling aids.

MA370 Advanced Algebra Applications
One trimester
Credit: One unit core mathematics or core elective credit
Prerequisite: MA305 Precalculus and Modeling.
Meeting pattern: Four periods per week.

This course is intended to be an immediate predecessor to a college calculus course. It is designed to reinforce the algebra skills required for success in calculus while applying them to a variety of topics not normally covered in high school precalculus, though still required in many college calculus courses. These topics may include conic sections, complex numbers, polar coordinates, spatial coordinate geometry, parametric equations, linear transformations of points and figures in the plane, or others. This course is intended for students who have not taken calculus.

MA372 Explorations in Advanced Geometry
One trimester
Credit: One unit core mathematics or core elective credit.
Meeting pattern: Five periods per week including lab.

In this course students investigate areas of geometry beyond those included in a one-year high school geometry course. Topics focus on the theory of constructability and proof; periodic and non-periodic tilings; three-dimensional geometry, including investigation of Platonic and Archimedean solids; and modeling through geometry. Students also explore selected topics independently. Emphasis is placed on gaining an
intuitive understanding of geometry as well as communicating and applying that understanding through projects, presentations, papers, extended problems, and daily discussion.

**MA404 AP Statistics (I)****
One trimester
Credit: One unit core mathematics or core elective credit.
Prerequisite: MA305 Precalculus and Modeling or permission of the Dean of Mathematics.
Meeting pattern: Four periods per week.

This course is designed to teach students to think about problems from a statistical point of view. Topics begin with univariate data analysis, including summary statistics and graphical techniques, with emphasis on interpretation and communication. Additional topics covered include normal distributions, introductory topics in sampling and experimental design, and probability.

**MA406 AP Statistics (II)****
One trimester
Credit: One unit core mathematics or core elective credit.
Prerequisite: Final grade of C or higher in MA404 AP Statistics (I).
Meeting pattern: Four periods per week.

This course continues the study of statistics, including topics in probability, sampling distributions, inference procedures for means and proportions, and chi-square tests for goodness of fit, homogeneity and independence. The course involves projects that require students to gather data and analyze results.

**MA408 AP Statistics (III)****
One trimester
Credit: One unit core mathematics or core elective credit.
Prerequisite: Final grade of C or higher in MA406 AP Statistics (II).
Meeting pattern: Four periods per week.

This course completes the topics on the AP Statistics syllabus with initial focus on correlation, regression, and inference procedures for slope. After the AP examination, students work on topics beyond the AP syllabus and/or projects.

MA404, MA406, MA408 constitute a comprehensive introduction to statistics and include all of the topics on the AP Statistics syllabus.
MA410 AP Calculus AB (Advanced Topics I)
One trimester
Credit: One unit core mathematics credit.
Prerequisite: Final grade of B- or higher in MA305 Precalculus and Modeling or permission of the Dean of Mathematics.
Meeting pattern: Four periods per week including lab.

This course introduces students to the concepts of differential calculus and the applications of calculus to mathematical modeling. Through class discussions, problem solving, laboratory experiences, and writing assignments students discover the important concepts of calculus, develop an understanding of these concepts, and use these concepts in solving realistic problems. This course generally includes the completion of a substantial mathematical modeling project. Calculators and computers are used as tools in the course. Topics normally covered include the derivative, techniques of differentiation, local linearity of functions, linear approximations, and the concept of a limit.

MA412 AP Calculus AB (Advanced Topics II)
One trimester
Credit: One unit core mathematics credit.
Prerequisite: Final grade of C or higher in MA410 AP Calculus AB (Advanced Topics I).
Meeting pattern: Four periods per week including lab.

This course continues the study of calculus and its applications to mathematical modeling. Through class discussions, problem solving, laboratory experiences, and writing assignments students discover the important concepts of calculus, develop an understanding of these concepts, and use these concepts in solving realistic problems. This course generally includes the completion of a substantial mathematical modeling project. Calculators and computers are used as tools in the course. Topics normally covered include applications of the derivative, Euler’s method, implicit differentiation and related rates, and the concepts of definite and indefinite integrals.

MA414 AP Calculus AB (Advanced Topics III)
One trimester
Credit: One unit core mathematics credit.
Prerequisite: Final grade of C or higher in MA412 AP Calculus AB (Advanced Topics II).
Meeting pattern: Four periods per week including lab.
This course continues the study of calculus and its applications to
mathematical modeling. Through class discussions, problem solving,
laboratory experiences, and writing assignments students discover the
important concepts of calculus, develop an understanding of these
concepts, and use these concepts in solving realistic problems. This
course generally includes the completion of a substantial mathematical
modeling project. Calculators and computers are used as tools in the
course. Topics normally covered include basic techniques of integration,
calculating area and total change of a function, numerical
approximations of integrals, separable differential equations, and other
applications of definite integrals.

MA410, MA412, MA414 constitute a comprehensive study of calculus and
include all of the topics on the AP Calculus AB syllabus.

**MA420 AP Calculus BC (I): Contemporary Calculus**
*One trimester*
*Credit:* One unit core mathematics credit.
*Prerequisite:* Final grade of B+ or higher in MA305 Precalculus and
Modeling or permission of the Dean of Mathematics.
*Meeting pattern:* Four periods per week including lab.

This course introduces students to the concepts of differential calculus
and the applications of calculus to mathematical modeling. Through
class discussions, problem solving, laboratory experiences, and writing
assignments students discover the important concepts of calculus,
develop an understanding of these concepts, and use these concepts in
solving realistic problems. This course generally includes the completion of
a substantial mathematical modeling project. Calculators and computers
are used as tools in the course. Topics normally covered include the
derivative, local linearity of functions, linear approximations, some
applications of the derivative, l’Hôpital’s rule and the concept of a limit.

**MA422 AP Calculus BC (II): Contemporary Calculus**
*One trimester*
*Credit:* One unit core mathematics credit.
*Prerequisite:* Final grade of B- or higher in MA420 AP Calculus BC (I).
*Meeting pattern:* Five periods per week including lab.

This course continues the study of calculus and its applications to
mathematical modeling. Through class discussions, problem solving,
laboratory experiences, and writing assignments students discover the
important concepts of calculus, develop an understanding of these
concepts, and use these concepts in solving realistic problems. This
course generally includes the completion of a substantial mathematical modeling project. Calculators and computers are used as tools in the course. Topics normally covered include additional applications of the derivative, an introduction to differential equations, slope fields, Euler’s method, definite and indefinite integrals, numerical approximations of integrals, calculating area and total change of a function, and some applications of integrals. Students also focus on skills necessary for success on the AP BC Calculus examination.

**MA424 AP Calculus BC (III): Contemporary Calculus**

*One trimester*

*Credit:* One unit core mathematics credit.

*Prerequisite:* Final grade of B- or higher in MA422 AP Calculus BC (II).

*Meeting pattern:* Four periods per week including lab.

This course continues the study of calculus and its applications to mathematical modeling. Through class discussions, problem solving, laboratory experiences, and writing assignments students discover the important concepts of calculus, develop an understanding of these concepts, and use these concepts in solving realistic problems. This course generally includes the completion of a substantial mathematical modeling project. Calculators and computers are used as tools in the course. Topics normally covered include additional discussion of Taylor series, additional techniques of integration, improper integrals, and more applications of integrals.

MA420 MA422, MA424 constitute a comprehensive study of calculus and include all of the topics on the AP Calculus BC syllabus.

**MA430 AP Calculus BC (Advanced Topics I): Contemporary Calculus**

*One trimester*

*Credit:* One unit core mathematics credit.

*Prerequisite:* Final grade of A or higher in MA305 Precalculus and Modeling or B+ or higher in MA355 Precalculus and Modeling with Advanced Topics or permission of the Dean of Mathematics.

*Meeting pattern:* Four periods per week including lab.

This course provides students with a fast-paced introduction to the concepts of differential calculus and the applications of calculus to mathematical modeling. Through class discussions, problem solving, laboratory experiences, and writing assignments students discover the important concepts of calculus, develop an understanding of these concepts, and use these concepts in solving realistic problems. This course generally includes the completion of a substantial mathematical
modeling project. Calculators and computers are used as tools in the course. Topics normally covered include the derivative, local linearity of functions, linear approximations, some applications of the derivative, l'Hopital's rule and the concept of a limit.

**MA432 AP Calculus BC (Advanced Topics II): Contemporary Calculus**

One trimester  
Credit: One unit core mathematics credit.  
Prerequisite: Final grade of B- or higher in MA430 AP Calculus BC (Advanced Topics I).  
Meeting pattern: Five periods per week including lab.

This course continues the accelerated study of calculus and its applications to mathematical modeling. Through class discussions, problem solving, laboratory experiences, and writing assignments students discover the important concepts of calculus, develop an understanding of these concepts, and use these concepts in solving realistic problems. This course generally includes the completion of a substantial mathematical modeling project. Calculators and computers are used as tools in the course. Topics normally covered include additional applications of the derivative, an introduction to differential equations, slope fields, Euler's method, definite and indefinite integrals, numerical approximations of integrals, calculating area and total change of a function, and some applications of integrals. Students also focus on skills necessary for success on the AP BC Calculus examination.

**MA434 AP Calculus BC (Advanced Topics III): Contemporary Calculus**

One trimester  
Credit: One unit core mathematics credit.  
Prerequisite: Final grade of B- or higher in MA432 AP Calculus BC (Advanced Topics II).  
Meeting pattern: Four periods per week including lab.

This course continues the accelerated study of calculus and its applications to mathematical modeling. Through class discussions, problem solving, laboratory experiences, and writing assignments students discover the important concepts of calculus, develop an understanding of these concepts, and use these concepts in solving realistic problems. This course generally includes the completion of a substantial mathematical modeling project. Calculators and computers are used as tools in the course. Topics normally covered include additional discussion of Taylor series and power series, additional techniques of integration, improper integrals, and more applications of integrals.
MA430, MA432, and MA434 constitute a comprehensive study of calculus and include all of the topics on the AP Calculus BC syllabus.

**MA436 Advanced Probability Models**  
*One trimester*
*Credit: One unit core mathematics credit.*  
*Corequisite: MA434 AP Calculus BC (Advanced Topics III).*  
*Meeting pattern: Four periods per week including lab.*

This course introduces students to some advanced methods for modeling data, including parameter estimation and model selection. Students study Poisson point processes in time and space; binomial, Poisson, Gaussian, and other probability models; likelihood ratios and Bayes as decision-making tools; and the Metropolis algorithm for estimating Bayesian posterior probability distributions.

**MA440 AP Statistics (Advanced Topics I)**  
*One trimester*
*Credit: One unit core mathematics or core elective credit.*  
*Corequisite: MA420 AP Calculus BC (I) and permission of the Dean of Mathematics.*  
*Meeting pattern: Four periods per week.*

This course gives advanced students an opportunity to study the ideas and topics in MA404 AP Statistics (I) in greater depth and at a faster pace. More emphasis is placed on the development of the mathematical underpinnings, especially those related to calculus and to the theory of statistics. Additional topics such as multiple regression are selected to supplement the course.

**MA442 AP Statistics (Advanced Topics II)**  
*One trimester*
*Credit: One unit core mathematics or core elective credit.*  
*Prerequisite: Final grade of C or higher in MA440 AP Statistics (Advanced Topics I).*  
*Meeting pattern: Four periods per week.*

This course is a faster-paced and more in-depth study of the topics in MA406 AP Statistics (III). More emphasis is placed on the development of the mathematical underpinnings of the expected value theorems and the introductory inference procedures. More sophisticated applications of probability are also included. The course involves project work that requires students to design and carry out experiments and analyze results.
MA444 AP Statistics (Advanced Topics III)
One trimester
Credit: One unit core mathematics or core elective credit.
Prerequisite: Final grade of C or higher in MA442 AP Statistics (Advanced Topics II).
Meeting pattern: Four periods per week.

This course is a faster-paced and more in-depth study of the topics in MA408 AP Statistics (III). More emphasis is placed on the development of the mathematical underpinnings, especially those related to calculus and to the theory of statistics. Additional topics such as analysis of variance are selected to supplement the course. The course involves project work that requires students to design and carry out experiments and analyze results.

MA440, MA442, MA444 constitute a comprehensive introduction to statistics and include all of the topics on the AP Statistics syllabus.

MA446 Advanced Mathematical Problem Solving I
MA448 Advanced Mathematical Problem Solving II
MA450 Advanced Mathematical Problem Solving III
One trimester each
Credit: One unit each additional elective credit.
Meeting pattern: Two periods per week.

These three one-trimester courses cover sophisticated mathematical topics and how they can be helpful in solving challenging problems in competitions such as the Mathematical Olympiads. Students work on problem sets each week. Students may enroll in and receive credit for any, or all, of these one-trimester courses and each course is repeatable for credit.

MA452 Explorations in Advanced Geometry with Topics
One trimester
Credit: One unit core mathematics or core elective credit
Prerequisite: A previous course in high school geometry and permission of the Dean of Mathematics.
Meeting pattern: Five periods per week including lab.

The topics and ideas of MA372 Explorations in Advanced Geometry are presented in greater depth, at a faster pace, and with a more analytical focus. Some topics are explored more extensively and additional topics
may be selected to supplement course materials. Students are expected to work more independently than they would in MA372.

**MA454 Modeling with Differential Equations**  
*One trimester*  
*Credit: One unit core mathematics or core elective credit.*  
*Corequisite: MA434 AP Calculus BC (Advanced Topics III).*  
*Meeting pattern: Four periods per week including lab.*  

In this course students examine what differential equations are and how they are used to model real world phenomena. They also look at different techniques for solving differential equations and interpret their solutions in a real world context. Analytical methods, geometric methods, and numerical methods are included. Technology is an important component of the course.

**MA456 Numerical Analysis**  
*One trimester*  
*Credit: One unit core mathematics or core elective credit.*  
*Prerequisite: Familiarity with a programming language.*  
*Corequisite: MA434 AP Calculus BC (Advanced Topics III).*  
*Meeting pattern: Five periods per week.*  

This course introduces students to the theory and practice of computational methods to analyze mathematical problems. Topics include computer arithmetic and computational error, function approximation, numerical differentiation and integration, curve-fitting, solving non-linear equations and systems of equations, and numerical solutions to ordinary differential equations. This course is the equivalent of a one-semester university course in numerical analysis.

**MA458 Introduction to Complex Systems**  
*One trimester*  
*Credit: One unit core mathematics or core elective credit.*  
*Corequisite: MA422 AP Calculus BC (II) and permission of the Dean of Mathematics.*  
*Meeting pattern: Four periods per week including lab.*  

This course is a survey of topics involving complex systems. Some of the topics studied in the course are fractals and iterated function systems, chaos and chaotic behavior, cellular automata and self-organization, genetic algorithms and neural networks. Students are expected to create a final project selected from the topics studied. JAVA applets and
computer programs are essential tools of the course. Familiarity with programming is advantageous but not necessary.

**MA460 Number Theory**  
*One trimester*  
*Credit:* One unit core mathematics or core elective credit.  
*Prerequisite:* Permission of the Dean of Mathematics.  
*Meeting pattern:* Five periods per week.

Selected topics from number theory, an advanced area of mathematics, are studied. They include divisibility properties of integers, special properties of prime numbers, congruences, Euler’s Phi function, and some applications to fields such as cryptography and computer science. The concept of proof is developed over the trimester and students work to improve their ability to read and write mathematics. Students with programming experience are encouraged to use this tool to investigate some of the ideas presented in the course. Strong interest and talent in mathematics are required.

**NOTE:** MA460 Number Theory and MA476 Group Theory are offered in alternate years and one is not prerequisite for the other. Students may begin their study in either year or may complete one in the junior year and then may enroll in the other in the senior year.

**MA462 Modeling with Matrices**  
*One trimester*  
*Credit:* One unit core mathematics or core elective credit.  
*Prerequisite:* MA422 AP Calculus BC (II) and permission of the Dean of Mathematics.  
*Meeting pattern:* Four periods per week including lab.

This introduction to linear algebra develops the arithmetic and algebra of matrices and how matrices and matrix operations can be used to model a variety of real-world phenomena. While focusing on applications, the course considers linear transformations, Euclidean vector spaces and inner product spaces, and eigenvectors and eigenvalues. Models include least squares, Fourier analysis, CT scans, morphs, and age specific growth models.

**MA464 Combinatorics and Game Theory**  
*One trimester*  
*Credit:* One unit core mathematics or core elective credit.  
*Prerequisite:* Permission of the Dean of Mathematics.  
*Meeting pattern:* Four periods per week.
This is a college-level mathematics course that introduces students to some of the major topics in combinatorics. Topics include permutations and combinations, binomial and multinomial expansions, inclusion-exclusion, methods of generating functions, recursive equations, and economic game theory. Strong interest and talent in mathematics are required.

**MA466 Graph Theory and Introduction to Proof**

*One trimester*

*Credit:* One unit core mathematics or core elective credit.

*Prerequisite:* Permission of the Dean of Mathematics.

*Meeting pattern:* Four periods per week.

This is a college-level mathematics course that has a dual purpose. We develop the theory and application of graphs, a major area of modern mathematics, and also provide an introduction to mathematical proof. Students develop their ability to make thoughtful conjectures, and to verify those conjectures with valid mathematical arguments. This is done by considering questions of graph structures and colorings, tree and path optimization, matrix representations, and some open questions in the field. Included is a two-week investigation of an open problem in which students demonstrate their ability to make conjectures and to write concise, complete, and coherent proofs. Strong interest and talent in mathematics are required.

**MA468 Structure and Dynamics of Modern Networks**

*One trimester*

*Credit:* One unit core mathematics or core elective credit.

*Prerequisite:* MA458 Introduction to Complex Systems and permission of the Dean of Mathematics.

*Meeting pattern:* Four periods per week including lab.

In the past ten years, a new area in science and mathematics has arisen. The science of networks is the science of the real world – the world of people, friendships, disease, firms, and financial crisis. We are connected in a small world with six degrees of separation, and this fact must affect our understanding of the world. Unlike calculus, this new area of mathematics is not yet complete. Though it has just begun to be developed, the way it is changing how we model the world and the mathematical tools we need is startling. This course investigates the mathematics of networks and systems. We consider the mathematical bases for social networks, computer networks, biological networks,
economic networks, and small world networks and their applications. The course requires reading original sources and modern research.

**MA470 Mathematical Modeling**

*One trimester*

*Credit*: One unit core mathematics or core elective credit.

*Prerequisite*: Senior standing and permission of the Dean of Mathematics.

*Corequisite*: MA430 AP Calculus BC (Advanced Topics I).

*Meeting pattern*: Four periods per week including lab.

Senior students with advanced mathematical knowledge are introduced to the creative and analytic aspects of modeling real-world phenomena. Models from engineering, biology, political science, management science, and everyday life are examined through a variety of techniques. When presented with a situation, students learn to develop, test, and revise an appropriate model. The course is project-oriented and focuses on applying the mathematics students already know. Group work is required, and students present their work in extensive written reports.

**MA472 Research in Mathematics I**

*One trimester*

*Credit*: One unit core mathematics or core elective credit.

*Prerequisite*: Permission of the Dean of Mathematics.

*Meeting pattern*: Three periods per week including lab.

This course is designed for students who have completed calculus and would like to work on a research team investigating an unsolved problem in mathematics. Since the research questions usually arise from the fields of graph theory and complex systems, students are encouraged to complete MA466 Graph Theory and Networks and MA458 Introduction to Complex Systems prior to enrolling in MA472 or to have completed comparable coursework in 9th or 10th grade. It is also recommended that students enroll in the Research in Mathematics Mini-term in junior year. The work of the research team typically begins in spring of junior year and students are expected to make significant progress on the problem over the summer on their own. The research concludes in fall of the senior year with MA474 Research in Mathematics II.

**MA474 Research in Mathematics II**

*One trimester*

*Credit*: One unit core mathematics or core elective credit.

*Prerequisite*: Completion of MA472 Research in Mathematics I and permission of the Dean of Mathematics.

*Meeting pattern*: Three periods per week including lab.
This course continues the project begun in MA472. Students write a formal paper presenting the background of the problem and any prior results found by other researchers. The students' results are then presented in standard mathematical form with all necessary detail in the proofs and corollaries presented. If the students' results warrant, the paper may be submitted for publication.

**MA476 Group Theory**

*One trimester*

**Credit:** One unit core mathematics or core elective credit.

**Prerequisite:** Permission of the Dean of Mathematics.

**Meeting Pattern:** Five periods per week.

Selected topics from group theory, an advanced area of mathematics are studied. Topics include groups, cyclic groups, Isomorphisms, normal sub-groups, Lagrange’s Theorem, and the Fundamental Theorem of Finite Abelian Groups. The concept of proof is developed over the trimester and students work to improve their ability to read and write mathematics. Strong interest and achievement in mathematics is required.

**NOTE:** MA476 Group Theory and MA460 Number Theory are offered in alternate years and one is not pre-requisite for the other. Students may begin their study in either year or may complete one in the junior year and then may enroll in the other in the senior year.

**MA478 Combinatorics and Game Theory with Advanced Topics**

*One trimester*

**Credit:** One unit core mathematics or core elective credit.

**Prerequisite:** Permission of the Dean of Mathematics.

**Meeting pattern:** Four periods per week.

This college-level mathematics course assumes familiarity with basic combinatorial reasoning. Students who have previously studied combinatorics for mathematics competitions or in a summer program will enhance their understanding and are encouraged to take this course. Topics include set and integer partitions, Fibonacci, Lucas and Stirling numbers, permutation groups, Polya and Burnside theorems, and posets. Combinatorial games will also be studied. Strong interest and talent in mathematics, and prior experience with combinatorial reasoning are required.

**MA480 Vector Functions and Partial Derivatives**

*One trimester*
Credit: One unit core mathematics or core elective credit.
Prerequisite: MA434 AP Calculus BC (Advanced Topics III) and permission of the Dean of Mathematics.
Meeting pattern: Four periods per week.

This is the first half of a university-level course in multivariable calculus. This course includes the theory and application of vector functions and partial derivatives. Topics include a vector approach to regression modeling, the Frenet-Serret equations, continuity and differentiability of functions of several variables, gradients and directional derivatives, and classic optimization problems. Numerical methods such as Newton’s Method for solving non-linear systems and modeling with vector-valued functions of scalar and scalar-valued functions of a vector are included.

**MA482 Multiple Integrals and Vector Fields**
One trimester
Credit: One unit core mathematics or core elective credit.
Prerequisite: MA480 Vector Functions and Partial Derivatives and permission of the Dean of Mathematics.
Meeting pattern: Four periods per week.

This is the second half of a university-level course in multivariable calculus. This course includes the theory and application of multiple integrals and vector fields. Topics include multiple integrals, the Jacobian and change of variables, and line and surface integrals. Significant time is devoted to consideration of Green’s Theorem, Stoke’s Theorem, and the Divergence Theorem. Numerical methods such as Simpson’s Rule for volumes under a surface and modeling with vector-valued functions of a vector are included.

**MA490, MA492, AND MA494 Advanced Mathematical Topics**
One trimester each
Credit: One unit each core mathematics or core elective credit.
Prerequisite: Permission of the Dean of Mathematics.

This course offers an opportunity for students with an especially strong background in mathematics to pursue a rigorous study of a topic outside the standard curriculum. The topic chosen may be in mathematics or a mathematical study of another field. Students are expected to make formal presentations and to write a paper on the topic. This course is intended for students who have exhausted the other course offerings in mathematics or who wish to do independent research in mathematics. Repeatable for credit.
DEPARTMENT of SCIENCE
The Department of Science at the North Carolina School of Science and Mathematics provides students the opportunity to take rigorous survey classes in biology, chemistry, and physics and to take accelerated courses in areas of specialized interest. NCSSM science courses are laboratory-intensive and designed to foster the development of critical thinking and problem-solving skills.

To meet graduation requirements in science, a student must complete a minimum of six trimester units of science (depending upon course placement) while in residence at the North Carolina School of Science and Mathematics and show competence in each of the three sciences by one of the following: passing coursework equal to at least two units of core science credit, passing an NCSSM chemistry or physics exemption test, or submitting a copy of the AP report showing the score needed to receive an NCSSM course exemption. A student exempted from a core science course must still complete at least six trimester units of laboratory science course credit at the North Carolina School of Science and Mathematics.

Students are required to complete at least three units of core science in at least two different science subject areas in the junior year.

NOTE: Students who place into MA301 Algebra 3 are not permitted to take both chemistry and physics in the junior year. Rather, these students may take chemistry and biology courses or physics and biology courses to meet the junior year science requirement.

COURSE OFFERINGS: Biology

Graduation Requirement in Biology
The graduation requirement in biology may be fulfilled by successful completion of two trimesters of any of the biology courses listed in this section. The biology course offerings address four general topical areas, with some courses overlapping topical areas: genetics (BI358, BI360, BI364, BI370, BI402, BI434, BI436); human body (BI352, BI364, BI416, BI422, BI434); cellular biology (BI360, BI410, BI422, BI434); and environmental biology (BI374, BI400, BI404, BI424, BI426). Research Experience in Biology (BI390) and, for selected students, the research in biology sequence (BI442, BI444, BI446, BI448) may also be used to meet the core biology requirement. See page 130 for conditions and options for exemption.
BI352 Anatomy & Physiology I  
One trimester  
Credit: One unit core biology or core elective credit.  
Meeting pattern: Five periods per week including lab.

This course provides an in-depth study of the structure and function of the human body. Topics include body organization, homeostasis, histology, and major organ systems, namely the integumentary, skeletal, muscular, cardiovascular, respiratory, digestive, urinary, and reproductive systems. The laboratory component of this course puts special emphasis on the microscopic analysis and dissection of relevant model animals.

BI358 Classical Genetics  
One trimester  
Credit: One unit core biology or core elective credit.  
Corequisite: MA305 Precalculus and Modeling.  
Meeting pattern: Four periods per week including lab.

This course begins with the fundamentals of cell division and focuses on modes of inheritance of traits, beginning with Mendel's pea plants and stressing extensions and exceptions to Mendel's principles. Laboratory activities, problem-solving, and critical thinking skills are emphasized.

BI360 Molecular Genetics  
One trimester  
Credit: One unit core biology or core elective credit.  
Corequisite: MA305 Precalculus and Modeling.  
Meeting pattern: Five periods per week including lab.

This course focuses on DNA. Beginning with Watson and Crick's double-helix model the course focuses on DNA structure, replication, transcription and translation. Current topics in DNA technology, gene cloning and bioinformatics are discussed. Critical thinking skills and thoughtful data interpretation are stressed.

BI364 Developmental Biology  
One trimester  
Credit: One unit core biology or core elective credit.  
Meeting pattern: Four periods per week including lab.

Building a viable multicellular organism from a single fertilized egg involves the coordination of many biological processes. This course studies the molecular and genetic mechanisms involved in embryogenesis with an emphasis on the processes that establish axis orientation of an embryo,
specify the fate of stem cells, and regulate the formation of organ systems. Inherent in the field of developmental biology is the comparison of these processes across a variety of species in their evolutionary context. Emphasizing experimental design and technical writing, this course focuses on applying modern and canonical laboratory techniques using live animal models. Students who have completed this course qualify for BI416 Anatomy and Physiology II, but it is also possible to take this course following BI416, if the student wishes.

**BI370 Evolution**  
*One trimester*  
*Credit:* One unit core biology or core elective credit.  
*Meeting pattern:* Five periods per week including lab.

In this course, students gain an appreciation for evolution as a process that is relevant to their everyday lives. Students learn to identify and quantify variation in populations and understand sources of variation. Basic evolutionary processes are studied including natural selection, mutation, drift, and migration. The course concludes with the study of speciation, phylogeny, and other selected topics.

*NOTE:* Students may take either this course or BI402 Evolution with Advanced Topics, but not both.

**BI374 Ecology**  
*One trimester*  
*Credit:* One unit core biology or core elective credit.  
*Meeting pattern:* Five periods per week including lab.

In this course students study ecology at the level of the organism, population, community, and ecosystem. Special emphasis is given to quantifying population growth and interspecific interactions, including predator-prey, and competitive relationships. Labs are designed to expose students to working with live organisms, seeing ecological patterns in the field, and quantifying ecological variables.

**BI390 Research Experience in Biology**  
*One trimester*  
*Credit:* One unit core biology or core elective credit.  
*Meeting pattern:* Four periods per week including lab.

This introductory course is for students who want to pursue a research opportunity in biology. During the first part of the course students learn to design and conduct an experiment, analyze data, and present their
findings in a written paper. In addition, students read and discuss scientific literature, including publications of local professional scientists. When possible, a local scientist joins us in the laboratory for a hands-on, directed experiment. The second portion of the course is devoted to working in small groups on a research project. Research questions may be selected from an area identified by the instructor (examples: microbiology, biotechnology, enzyme studies, food science, neurobiology), or from topics proposed by the student if appropriate. Students then write a final paper describing their research and make a formal oral and visual presentation of their findings.

**BI400 Aquatic Ecology**

*One trimester*

*Credit:* One unit core biology or core elective credit.

*Prerequisite:* Completion of BI374 Ecology.

*Meeting pattern:* Four periods per week including lab.

Aquatic ecology is the study of abiotic and biotic factors that influence the structure and dynamics of aquatic ecosystems. It includes the chemical, physical, and biological characteristics of streams, lakes, estuaries, and intertidal zones. Special emphasis is placed on interactions between abiotic and biotic factors, energy flow in food webs, and the role of humans in altering aquatic ecosystems. Students learn about ongoing research in aquatic ecology and gain experience making field observations, designing experiments, and analyzing data to test hypotheses. Regular outdoor experiences, both on and off campus, expose students to a variety of aquatic ecosystems.

**BI402 Evolution with Advanced Topics**

*One trimester*

*Credit:* One unit core biology or core elective credit.

*Corequisite:* MA305 Precalculus & Modeling.

*Meeting pattern:* Four periods per week including lab.

In this course students learn about genetics at the population level and start the course by identifying and quantifying variation in populations. Evolutionary processes, such as natural selection, drift, mutation, migration, and non-random mating are studied alone and in all possible combinations. Students explore how natural selection produces adaptations at the morphological and molecular levels. The course concludes with a study of macro evolutionary patterns including speciation. In contrast to BI370 Evolution, this course is faster-paced, places more emphasis on mathematical models, and requires more independent learning.
NOTE: Students may take either this course or BI370 Evolution, but not both.

**BI404 Climate Change Biology**
*One trimester*
CREDIT: One unit core biology or elective credit.
PREREQUISITE: Completion of a precalculus course, or a computer science course or permission of the Dean of Science.
MEETING PATTERN: Four periods per week including lab.

Climate change biology is the study of the impact of climate change on natural systems with emphasis on understanding the interactions between biological systems and the climate system. The goal of climate change biology is the development of management techniques designed to preserve natural systems. Students study past climate-biological systems interactions, currently observed changes, biological theory, and modeling in order to develop an understanding of possible mitigation and management approaches.

**BI406 Neuroscience**
*One trimester*
CREDIT: One unit core biology or elective credit.
PREREQUISITE: BI352 Anatomy and Physiology I or BI364 Developmental Biology, or BI410 Molecular and Cellular Biology, or permission of the Dean of Science.
COREQUISITE: MA305 Precalculus & Modeling.
MEETING PATTERN: Four periods per week including lab.

The goal of this course is to provide an introduction to the biological basis of behavior at cellular, systems, and organismal levels. This course enables students to understand the physiological and anatomical mechanisms underlying complex behaviors such as motor control, auditory and visual perception, higher order processing, and memory. Additionally, we discuss the fields of neuropsychology and neuroeconomics, providing an entry into how scientists attempt to understand the complexity of our human experience as sentient biological entities. This course emphasizes writing and peer review.

**BI410 Molecular and Cellular Biology**
*One trimester*
CREDIT: One unit core biology or core elective credit.
PREREQUISITE: Completion of a high school chemistry course.
MEETING PATTERN: Five periods per week including lab.
The first portion of this course examines biochemical principles and the structure and properties of lipids, proteins, and carbohydrates. Students then examine cellular structure and function common to most eukaryotic organisms. Topics include cellular components, membrane function, energetics, and enzyme function. Laboratory activities are designed to develop critical thinking skills and thoughtful data interpretation.

**BI416 Anatomy and Physiology II**
*One trimester*
*Credit:* One unit core biology or core elective credit.
*Prerequisite:* BI352 Anatomy and Physiology I or BI364 Developmental Biology, or BI410 Molecular and Cellular Biology, or permission of the Dean of Science.
*Meeting pattern:* Five periods per week including lab.

Building upon the concepts learned in BI352 Anatomy and Physiology I, and emphasizing experimental design and technical writing, this course provides an in-depth study of the essential nutrients needed to maintain human health. Topics include homeostasis, the disease-state and the major organ systems discussed in BI352 Anatomy and Physiology I. The laboratory component of the course explores physiological concepts via experimentation.

**BI422 Immunology**
*One trimester*
*Credit:* One unit core biology or core elective credit.
*Prerequisite:* BI360 Molecular Genetics, or BI410 Molecular and Cellular Biology, or BI434 AP Biology (I), or permission of the Dean of Science.
*Meeting pattern:* Four periods per week including lab.

This course extends the concepts of molecular and cellular biology to focus upon the mechanisms that compose the immune system. We begin with the general properties and development of immunity and proceed to generation of B-cell and T-cell responses, immune effector mechanisms and the immune system in health and disease. Specific topics include expression of immunoglobulin genes, hypersensitivity, leukocyte migration and inflammation, AIDS and other immunodeficiencies, autoimmunity, transplantation immunology, and vaccines.

**BI424 AP Environmental Science (I)**
*One trimester*
*Credit:* One unit core biology or core elective credit.
Prerequisite: One course in biology and one course in chemistry, or one course in biology and one trimester of NCSSM chemistry, or permission of the Dean of Science.
Meeting pattern: Four periods per week including lab.

This course focuses on the study of natural Earth processes in order to understand how these processes have grown interdependent over millennia to form a life-supporting and balanced Earth system. Due to the interdisciplinary nature of this course, the laboratory and field components include a variety of activities from analysis of existing data sets to experimental design.

**BI426 AP Environmental Science (II)**
One trimester
Credit: One unit core biology or core elective credit.
Prerequisite: BI424 AP Environmental Science (I).
Meeting pattern: Four periods per week including lab.

This course continues the study of the environment with emphasis on the effect of human activity on the Earth’s natural processes in order to consider how economic development and human activity can be practiced in a sustainable manner. Many of the field trips and labs are off campus and outdoors. Students who master the concepts covered in both trimesters of environmental science are prepared for the AP Environmental Science examination.

NOTE: Due to the variation of the residential trimester calendar and the NCSSM Online semester calendar, BI430 Advanced Topics in Environmental Science in the NCSSM Online program is not an acceptable prerequisite for BI426 AP Environmental Science (II) in the residential program.

**BI434 AP Biology (I)**
**BI436 AP Biology (II)**
**BI438 AP Biology (III)**
One trimester each
Credit: One unit each core biology or core elective credit.
Prerequisite: Senior standing and completion of a general biology course and a chemistry course with a final grade of B or higher. Juniors who have completed a general biology course and a chemistry course with a grade of A or higher and permission of the Dean of Science may also qualify.
Meeting pattern: Four periods per week including lab.
This course is a survey of all areas of biology. It is divided into three terms. In BI434 students investigate molecular and cellular biology as well as Mendelian genetics. BI436 includes DNA science, evolutionary biology, and phylogeny. BI438 covers organisms and populations. This course has a strong laboratory emphasis, which includes the twelve laboratories suggested by the AP. Students may enroll in and receive credit for any, or all, of these one-trimester courses.

**BI442 Research in Biology I**
One trimester
Credit: One unit core biology or core elective credit.
Prerequisite: Permission of the Dean of Science.
Meeting pattern: Eight periods per week including two labs.

This is an advanced course for second trimester junior students with the maturity, independence, and motivation necessary to conduct their own research project. Students learn the scientific method and experimental design before conducting a trial experiment on a small scale. Students then write a literature review on the topic of interest to them. Throughout the term students read from the primary scientific literature and participate in discussion groups on current issues in biological research. Based on the outcomes of the term’s work, students may be given an opportunity to participate in summer research programs on campus or in the Triangle area. Students with a final grade of B or higher are expected to continue in BI444 Research in Biology II.

**BI444 Research in Biology II**
One trimester
Credit: One unit core biology or core elective credit.
Prerequisite: Final grade of B or higher in BI442 Research in Biology I, or successful participation in a summer research program, and permission of the Dean of Science.
Meeting pattern: Eight periods per week including two labs.

Students write a detailed research proposal and defend it to a panel of their peers. Students begin to learn techniques and to gather data for their experiments.

**BI446 Research in Biology III**
One trimester
Credit: One unit core biology or core elective credit.
Prerequisite: Final grade of B or higher in BI444 Research in Biology II and permission of the Dean of Science.
Meeting pattern: Eight periods per week including two labs.
Students continue work on their previous research to produce additional data and conduct statistical analysis, as needed. They may research extension questions based on their original work. Students write a formal research paper and prepare a formal presentation. Students are required to present their results at the NCSSM Research Symposium in the spring and are encouraged to present their research at the North Carolina Student Academy of Science competition and other competitions.

**BI448 Research in Biology IV**

*One trimester*

**Credit:** One unit core biology or core elective credit.

**Prerequisite:** Final grade of B or higher in BI446 Research in Biology III and permission of the Dean of Science.

**Meeting pattern:** Eight periods per week including two labs.

Students in this course have a leadership role in working with students enrolled in BI442 Research in Biology I. Students are responsible for mentoring these incoming students, participating in discussion groups, and assisting with special projects as requested by the instructor. In addition, each student is responsible for creating and presenting a lesson on some aspect of scientific methodology.

**COURSE OFFERINGS: Chemistry**

**Graduation Requirement in Chemistry**

The graduation requirement in chemistry may be fulfilled by successful completion of CH305 Chemistry by Inquiry, CH307 Chemistry, CH401 AP Chemistry (I), or CH405 AP Chemistry (Advanced I). See page 130 for conditions and options for exemption.

**Placement**

**Junior students** are placed in their NCSSM chemistry course based on scores on the NCSSM chemistry placement test, NCSSM physical science placement test, and NCSSM mathematics placement. Depending on placement information, students who have had one year of chemistry before coming to NCSSM may be enrolled in CH305 Chemistry by Inquiry, CH307 Chemistry, CH401 AP Chemistry (I), or CH405 AP Chemistry (Advanced I). Students who have not had a year of high school chemistry before coming to NCSSM may be enrolled in CH305, CH307 or CH401. **Senior students** taking MA430 AP Calculus BC (Advanced Topics I) or higher level mathematics, who have completed a previous chemistry course, will be enrolled in CH401 or CH405.
CH305a/CH305b/CH305c Chemistry by Inquiry
One year
Credit: Three units core chemistry credit.
Meeting pattern: Five periods per week including lab.

This survey chemistry course includes atomic and molecular structure, chemical reactions, stoichiometry, physical properties, thermodynamics, kinetics, equilibrium, and electrochemistry. Emphasis is on developing inquiry skills required for learning science along with specific reading and writing, problem solving, and technology applications. A review of pertinent math skills accompanies each topic as needed. The course includes a strong laboratory component that encompasses many laboratory techniques.

CH307a/CH307b Chemistry
Two trimesters
Credit: Two units core chemistry credit.
Meeting pattern: Five periods per week including lab.

This course provides a thorough treatment of chemical principles using a college-level textbook. It is a rigorous course that covers the fundamental concepts (atomic theory, chemical bonding, molecular structure, chemical reactions, thermodynamics, kinetics theory, chemical equilibrium, acid bases, and electrochemistry.) However, it requires less preparation in mathematics than does CH401 AP Chemistry (I). Students who earn a course grade of A or higher in CH307 Chemistry may request permission of the Dean of Science to take CH402 AP Chemistry (II).

CH360 Topics in Chemistry
One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of a high school chemistry course.
Meeting pattern: Four periods per week including lab.

This course offers the opportunity for deeper exploration of a particular area of chemistry not covered in other chemistry offerings. The focus varies from year to year and is announced with the course offerings are published.

CH390 Research Experience in Chemistry
One trimester
Credit: One unit core elective credit.
Meeting pattern: Four periods per week including lab.
This introductory course is for students who want to pursue a research opportunity in chemistry. During the first part of the course students learn to design and conduct an experiment, analyze data, and present their findings in a written paper. In addition, students read and discuss scientific literature, including publications of local professional scientists. When possible, a local scientist joins us in the laboratory for a hands-on, directed experiment. The second portion of the course is devoted to working in small groups on a research project. Research questions may be selected from an area identified by the instructor (examples: nutrition, renewable energy, air pollution, water pollution, recycling, sustainable science, environmental science), or from topics proposed by the student if appropriate. Students then write a final paper describing their research and make a formal oral and visual presentation of their findings.

**CH401a/CH401b AP Chemistry (I)**

- **Two trimesters**
- **Credit:** Two units core chemistry credit.
- **Prerequisite:** Algebra 2 and permission of the Dean of Science.
- **Corequisite:** MA305 Precalculus and Modeling.
- **Meeting pattern:** Five periods per week including lab.

This course, like CH307 Chemistry, covers the fundamental concepts of chemistry. It uses a college-level textbook and moves at a faster pace than CH307, thereby covering additional topics and treating many areas in greater depth. Students should have strong math and abstract reasoning skills. Students interested in taking the AP Chemistry examination should enroll in CH402 AP Chemistry (II) if they meet the prerequisites.

**CH402 AP Chemistry (II)**

- **One trimester**
- **Credit:** One unit core elective credit.
- **Prerequisite:** Completion of CH401 AP Chemistry (I) with a course grade of B- or higher, or completion of CH307 Chemistry with a course grade of A or higher and permission of the Dean of Science, or permission of the Dean of Science.
- **Meeting pattern:** Five periods per week including lab.

This course provides students with additional topics and depth not covered in CH401. Emphasis is on completion of the AP chemistry curriculum along with further development of laboratory and problem solving skills.
CH405a/CH405b AP Chemistry (Advanced I)
Two trimesters
Credit: Two units core chemistry credit.
Prerequisite: CH305 Chemistry by Inquiry, or CH307 Chemistry or an adequate score on Chemistry Placement examination, and permission of the Dean of Science.
Corequisite: MA305 Precalculus and Modeling.
Meeting pattern: Five periods per week including lab.

This course is designed for students who already have a mastery of the basic concepts of chemistry. Molecular orbital theory, complex ions and other advanced topics are included. Students are also exposed to instrumentation and computation as part of their lab skills development. Activities and labs are designed to provide opportunities for students to develop problem-solving and laboratory skills as they learn to design and conduct chemistry projects, as well as to become independent learners. Students who have successfully completed the first two trimesters and plan to take the AP Chemistry examination should enroll in CH406 AP Chemistry (Advanced II) during third trimester.

CH406 AP Chemistry (Advanced II)
One trimester
Credit: One unit core elective credit,
Prerequisite: Completion of CH405 AP Chemistry (Advanced I) with a grade of B- or higher or permission of the Dean of Science.
Meeting pattern: Four periods per week including lab.

This course provides students with additional topics and depth not covered in CH405. Emphasis is on completion of the AP chemistry curriculum along with further development of laboratory and problem solving skills. Additionally, students have the opportunity to complete a chemistry project.

CH408 Analytical Chemistry
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of A- or higher in CH305 Chemistry by Inquiry or CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry (I) or CH405 AP Chemistry (Advanced I), or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.
Meeting pattern: Five periods per week including lab.

This course examines the analysis of compounds using different separation and purification techniques including, but not limited to thin-layer, ion-
exchange, and gel-filtration chromatography as well as instrumental analysis techniques such as gas chromatography (GC), high performance liquid chromatography (HPLC), visible and ultraviolet spectroscopy (UV-VIS), atomic absorption spectroscopy (AA) and infrared spectroscopy (IR). The laboratory component is an important part of the course and special emphasis is placed on the analysis of biochemical compounds.

**CH410 Organic Chemistry**  
*One trimester*  
*Credit:* One unit core elective credit.  
*Prerequisite:* Final grade of A- or higher in CH305 Chemistry by Inquiry or CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry (I) or CH405 AP Chemistry (Advanced I), or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.  
*Meeting pattern:* Five periods per week including lab.

This course introduces students to the structure, synthesis, and reactions of the major functional groups present in organic compounds. Reaction mechanisms, stereochemistry, and the prediction of products are covered. The laboratory involves synthetic and separation techniques and the use of physical and instrumental methods of verifying the products of reactions. Most of the experiments are performed at a micro scale level.

**CH416 Environmental Chemistry**  
*One trimester*  
*Credit:* One unit core elective credit.  
*Prerequisite:* CH305 Chemistry by Inquiry, CH307 Chemistry, CH401 AP Chemistry (I), or CH405 AP Chemistry (Advanced I) and permission of the Dean of Science.  
*Meeting pattern:* Five periods per week including lab.

This course focuses on the chemistry associated with topics of environmental concern such as acid rain, photochemical smog, global warming, and water and land pollution. Principles of sustainable development are addressed within each of these topics, and solutions that may contribute to a sustainable future are discussed. Laboratory activities include field and sampling trips that focus on the fate of chemicals in the environment. A service-learning component enables students to apply their knowledge and understanding to the solution of a local or regional environmental problem.

**CH418 Biochemistry: Structure and Dynamics**  
*One trimester*
Credit: One unit core elective credit.
Prerequisite: Final grade of A- or higher in CH305 Chemistry by Inquiry or CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry (I) or CH405 AP Chemistry (Advanced I), or exemption from the NCSSM core chemistry requirement, and permission of the Dean of Science.
Meeting pattern: Five periods per week including lab.

This course introduces students to biochemistry that focuses on the chemical structure and dynamic interactions of the four major classes of biological macromolecules: proteins, nucleic acids, carbohydrates and lipids. Students examine the thermodynamics and kinetics of enzymes and explore how enzymes catalyze reactions in the cell. In the laboratory, the students purify and characterize an enzyme from a biological sample.

CH422 Polymer Chemistry
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of A- or higher in CH305 Chemistry by Inquiry or CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry (I) or CH405 AP Chemistry (Advanced I), or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.
Meeting pattern: Five periods per week including lab.

This course is an introduction to polymer science. Its scope includes fundamental principles of bonding as related to macromolecules and important structure-property relationships. Laboratory work includes natural polymer modification, synthesis of linear and cross-linked polymers, characterization of polymers using infrared spectroscopy, thermal analysis, and viscosity measurements.

CH442 Research in Chemistry I
One trimester
Credit: One unit core elective credit.
Prerequisite: Trimester grade of B or higher in an NCSSM chemistry course, or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.
Meeting pattern: Eight periods per week including two labs.

This is an advanced course for second or third trimester junior students with the maturity, independence, and motivation necessary to conduct their own research project. Students learn scientific methodology and experimental design before conducting a trial experiment on a small scale. Students then write their own research proposals on a problem of
interest to them. Throughout the term students read from the primary scientific literature and participate in discussion groups on current issues in scientific research. Based on the outcomes of the semester’s work, students may be given an opportunity to participate in summer research programs on campus or in the Triangle area. Students with a final grade of B or higher are encouraged to continue in CH444 Research in Chemistry II.

**CH444 Research in Chemistry II**
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of B or higher in CH442 Research in Chemistry I, or successful participation in a summer research program, and permission of the Dean of Science.
Meeting pattern: Eight periods per week including two labs.

In this course, students continue to gather and analyze experimental data based on their previous term and/or summer work. Time is devoted to the completion of the research project and a written paper. Students are required to present their results at the NCSSM Research Symposium and are encouraged to present their research at the North Carolina Student Academy of Science competition and other state and national competitions.

**CH446 Research in Chemistry III**
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of B or higher in CH444 Research in Chemistry II, and permission of the Dean of Science.
Meeting pattern: Eight periods per week including two labs.

In this course, students continue work on their previous research to produce additional data and analysis, as needed, or to research extension questions based on their original work. Students in this course have a leadership role in working with the junior students enrolled in CH442 Research in Chemistry I.

**CH448 Research in Chemistry IV**
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of B or higher in CH446 Research in Chemistry III, and permission of the Dean of Science.
Meeting pattern: Eight periods per week including two labs.
In this course, students continue work on their previous research to produce additional data and analysis, as needed, or to research extension questions based on their original work. Students in this course have a leadership role in working with the junior students enrolled in CH442 Research in Chemistry I and may serve as teaching assistants.

**COURSE OFFERINGS: Physics**

**Graduation Requirement in Physics**
The graduation requirement in physics may be fulfilled by one of these NCSSM physics courses or course sequences: PH307 Physics, PH355 Physics with Advanced Topics, or PH404 AP Physics C: Mechanics (I)/PH406 AP Physics C: Mechanics (II)/Electricity and Magnetism (I). See page 130 for conditions and options for exemption.

**Placement**
Junior students' physics placement is based on scores on the NCSSM physical science placement test and NCSSM mathematics placement, and, for PH356 Physics with Advanced Topics II or PH404 AP Physics C: Mechanics (I), on an NCSSM physics placement test given during Orientation in August. Senior students' physics placement is based on their performance in NCSSM science and math courses in the junior year, their senior year math placement, and, for certain courses, on a placement test. Students who have completed, or are taking, MA430 AP Calculus BC (Advanced Topics I) or higher mathematics are placed in PH355 Physics with Advanced Topics. PH307 Physics and PH355 Physics with Advanced Topics are honors-level physics courses that require no previous experience in physics.

**PH304 Astronomy**
One trimester
Credit: One unit core elective credit.
Meeting pattern: Four periods per week or two 90-minute evening class meetings.

This introductory astronomy course focuses on using observations to create predictive models. Physics and chemistry concepts are introduced as needed. Topics include the sky, seasons, phases of the moon, our solar system, and the search for extrasolar planets. Students use computers extensively to analyze data and access resources. Opportunities for telescope observations are available.
**PH307a/PH307b/PH307c Physics**
One year
Credit: Three units core physics credit.
Meeting pattern: Five periods per week including lab (trimester 1), Four periods per week including lab (trimesters 2 and 3).

This course provides an algebra-based foundation in the processes of physics, with an emphasis on qualitative and quantitative reasoning. Topics explored may include mechanics, wave motion, and electricity and magnetism. Laboratory activities, which are a key component of the course, are inquiry-based, meaning students design their own experiments in order to answer scientific questions and learn content by completing real-world projects and applications. Students also gain experience with scientific writing and communication.

**PH355a/PH355b Physics with Advanced Topics**
Two trimesters
Credit: Two units core physics credit.
Corequisite: MA305 Precalculus and Modeling.
Meeting pattern: Five periods per week including lab.

This course provides a precalculus-based foundation in the principles of general physics. The first term covers the laws of motion, force, momentum, and energy. In the second term students investigate the laws of electricity and magnetism, wave motion, and simple harmonic motion. The laboratory experience emphasizes the use of the computer in both the collection and the analysis of laboratory data. Activities in this course are designed to encourage the development of the following skills: excellence in qualitative and quantitative problem solving, independent learning from the course textbooks, careful and thoughtful experimental habits in lab, and proficiency in writing lab reports.

**PH356 Physics with Advanced Topics II**
One trimester
Credit: One unit core physics credit.
Prerequisite: Modified exemption of the NCSSM core physics requirement, and permission of the Dean of Science.
Corequisite: MA305 Precalculus and Modeling.
Meeting pattern: Five periods per week including lab.

This course provides additional precalculus-based foundation in the principles of general physics for students who have already demonstrated proficiency in mechanics. Students investigate the laws of electricity and magnetism, wave motion, and simple harmonic motion. The laboratory
experience emphasizes the use of the computer in both the collection and the analysis of laboratory data. Activities in this course are designed to encourage the development of the following skills: excellence in qualitative and quantitative problem solving, independent learning from the course textbooks, careful and thoughtful experimental habits in lab, and proficiency in writing lab reports.

**PH390 Research Experience in Physics**
*One trimester*
*Credit: One unit core elective credit.*
*Meeting pattern: Four periods per week including lab.*

This introductory course is for students who want to pursue a research opportunity in physics. During the first part of the course students learn to design and conduct an experiment, analyze data, and present their findings in a written paper. In addition, students read and discuss scientific literature, including publications of local professional scientists. When possible, a local scientist joins us in the laboratory for a hands-on, directed experiment. The second portion of the course is devoted to working in small groups on a research project. Research questions may be selected from an area identified by the instructor (examples: sports science, biomechanics, video analysis of different motion types, projectile motion), from questions selected from USAYPT (United States Association for Young Physicists Tournaments) problems for the current year’s competition, or from topics proposed by the student, if appropriate. Students then write a final paper describing their research and make a formal oral and visual presentation of their findings. Students who choose to participate in the USAYPT program should plan to continue their work independently during the summer and the following academic year.

**PH402 Modern Physics**
*One trimester*
*Credit: One unit core elective credit.*
*Prerequisite: Final grade of A- or higher in PH307 Physics or final grade of B+ or higher in PH355 Physics with Advanced Topics or exemption from NCSSM core physics requirement, and permission of the Dean of Science. MA305 Precalculus and Modeling or MA355 Precalculus and Modeling with Advanced Topics.*
*Meeting pattern: Five periods per week including lab.*

This course continues the PH307 or PH355 courses by surveying the physics developed since the start of the twentieth century. Topics are selected from special and general relativity, atomic and nuclear structure, particle-
wave duality, quantum mechanics, elementary particles, and grand unified theories.

**PH404 AP Physics C: Mechanics (I)**

*One trimester*

**Credit:** One unit core physics or core elective credit.

**Prerequisite:** Final grade of A- or higher in PH307 Physics or final grade of B+ or higher in PH355 Physics with Advanced Topics or exemption from NCSSM core physics requirement, and permission of the Dean of Science.

**Corequisite:** MA420 AP Calculus BC (I).

**Meeting pattern:** Four periods per week including lab.

This course provides a thorough treatment of classical mechanics up to, but not including, angular momentum. Calculus is used where needed and is treated at a level appropriate to students who are taking MA420 or higher-level calculus course. An excellent grasp of the fundamental concepts taught in introductory physics is assumed. There is a strong problem-solving emphasis and the course includes a lab component. Students who have taken PH307 will find it necessary to study some additional topics not taught in those courses. This course may be used to prepare for the Mechanics portion of the AP C Physics examination, but its breadth and depth are significantly higher than that of a typical AP C Physics course.

**PH406 AP Physics C: Mechanics (II)/Electricity and Magnetism (I)**

*One trimester*

**Credit:** One unit core physics or core elective credit.

**Prerequisite:** Final grade of B or higher in PH404 AP Physics C: Mechanics (I), and permission of the Dean of Science.

**Corequisite:** MA422 AP Calculus BC (II).

**Meeting pattern:** Four periods per week including lab.

This course provides the completion of classical mechanics (in particular, the study of angular momentum and of gravitational fields) and an introduction to electronic forces and fields, Gauss’ law, capacitance, and voltage. Calculus is used where needed and is treated at a level appropriate to students who are taking MA422 AP Calculus BC (Advanced Topics II). Completion of PH404 and this course may be used to prepare for the Mechanics portion of the AP C Physics examination, but its breadth and depth are significantly higher than that of a typical AP C Physics course.

**PH408 AP Physics C: Electricity and Magnetism (II)**

*One trimester*
Credit: One unit core physics or core elective credit.

Prerequisite: Final grade of B or higher in PH406 AP Physics C: Mechanics (II)/Electricity and Magnetism (I), MA422 AP Calculus BC (III) and permission of the Dean of Science.

Meeting pattern: Four periods per week including lab.

This course continues the study of electromagnetism. Topics include electric circuits (R, RC, and RL), magnetism, Ampere’s law, induction, and the Faraday/Lenz law. Emphasis is on the completion of the AP C Physics curriculum. Topics in geometrical and physical optics are offered after the completion of the AP syllabus. There is a strong problem-solving emphasis and the course includes a lab component. Calculus is used where needed and is treated at a level appropriate to students who have taken MA422 AP Calculus BC (II). Completion of PH406 and this course may be used to prepare for the electricity and magnetism portion of the AP C Physics examination. The breadth and depth of this course are significantly higher than that of a typical AP C physics course.

**PH410 Fluids, Thermodynamics, Electromagnetism, and Optics**

One trimester

Credit: One unit core elective credit.

Prerequisite: Final grade of B+ or higher in PH355 Physics with Advanced Topics or permission of the Dean of Science.

Meeting pattern: Five periods per week including lab.

This course covers topics not included in PH355 Physics with Advanced Topics, including thermodynamics, fluids, electromagnetism, and optics. The laboratory experience in this course emphasizes the use of the computer in both the collection and analysis of laboratory data. Activities in this course are designed to encourage the development of the following skills: excellence in qualitative and quantitative problem solving, independent learning from the course textbooks, careful and thoughtful experimental habits in lab, and proficiency in writing lab reports.

**PH412 Computational Physics**

One trimester

Credit: One unit core elective credit.

Prerequisite: Completion of an honors-level high school physics course

Meeting pattern: Five periods per week including lab.

Students are introduced to basic methods of numerical analysis, and learn and write programs in the Python programming language to solve problems utilizing these methods. Students also create simulations of physics events both numerically and visually.
(Note: this course does not satisfy laboratory science requirements for graduation, but may otherwise be taken for core elective credit.

**PH418 Astrophysics**
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of A- or higher in PH307 Physics or B+ or higher in PH355 Physics with Advanced Topics or exemption from NCSSM core physics requirement, or permission of the Dean of Science, and MA305 Precalculus and Modeling.
Meeting pattern: Five periods per week including lab.

The emphasis in this course is on how astronomers extract physical information about stars, galaxies, and interstellar matter from observations of spectral and apparent brightness. The course covers the origin, structure, and evolution of stars like the sun. Interstellar matter, galaxies, and the universe are discussed briefly. Students are expected to integrate physics and chemistry principles into the study of stellar structure and evolution. Opportunities for telescope observation and image processing projects are available.

**PH420 Galaxies and Cosmology**
One trimester
Credit: One unit core elective credit.
Prerequisite: PH418 Astrophysics.
Meeting pattern: Five periods per week including lab.

This course emphasizes the origin, structure, and evolution of massive stars and the events that lead to supernovas, black holes, and neutron stars. The origin, structure, and evolution of galaxies and the universe are also studied in detail. Students are expected to integrate physics and chemistry principles into the study of both stellar and galactic structure and evolution. Opportunities for telescope observation and image processing projects are available.

**PH442 Research in Physics I**
One trimester
Credit: One unit core elective credit.
Prerequisite: B or higher earned in one trimester of core physics at NCSSM, or exemption from NCSSM core physics requirement; and permission of the Dean of Science.
Meeting pattern: Eight periods per week including two labs.
This is an advanced course for students with the maturity, independence, and motivation necessary to conduct their own research project. Students learn scientific methodology and experimental design before conducting a trial experiment on a small scale. Students may then be paired into research groups to write a research proposal on a problem of interest to them. Throughout the course, students read from the primary scientific literature and participate in discussion groups on current issues in scientific research. Based on the outcomes of the trimester’s work, students may be given an opportunity to participate in summer research programs on campus or in the Triangle area. Students with a final grade of B or higher are encouraged to continue in PH444 Research in Physics II.

**PH444 Research in Physics II**
One trimester  
Credit: One unit core elective credit.  
Prerequisite: Final grade of B or higher in PH442 Research in Physics I or successful participation in a summer research program; and permission of the Dean of Science.  
Meeting pattern: Eight periods per week including two labs.

In this course, students continue to gather and analyze experimental data based on their previous trimester and/or summer work. Time is devoted to the completion of the research project and a written paper. Students are required to present their results at the NCSSM Research Symposium and are encouraged to present their research at the North Carolina Student Academy of Science competition and other state and national competitions.

**PH446 Research in Physics III**
One trimester  
Credit: One unit core elective credit.  
Prerequisite: Final grade of B or higher in PH444 Research in Physics II, and permission of the Dean of Science.  
Meeting pattern: Eight periods per week including two labs.

In this course, students continue work on their previous research to produce additional data and analysis, as needed, or to research extension questions based on their original work. Students in this course have a leadership role in working with the junior students enrolled in Research in Physics.

**PH448 Research in Physics IV**
One trimester  
Credit: 1 unit core elective credit.
Prerequisite: Final grade of B or higher in PH446 Research in Physics III, and permission of the Dean of Science.
Meeting pattern: Eight periods per week including two labs.

In this course, students continue work on their previous research to produce additional data and analysis, as needed, or to research extension questions based on their original work. Students in this course have a leadership role in working with the junior students enrolled in Research in Physics and may serve as teaching assistants.

**Interdisciplinary Elective Courses**

Interdisciplinary courses are special electives in which the course content combines topics and issues from two or more traditional areas of study. These courses may be used for core elective graduation credit but do not meet graduation requirements in a specific subject area.

**IE306 Forensic Science**

One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of one course in either biology or chemistry, concurrent enrollment in the other and completion of algebra.
Meeting pattern: Four periods per week including lab.

This one trimester course is designed to give NCSSM students an introduction and broad overview of forensic science. This course focuses on crime scene investigation, including evidence collection, processing a scene, and lab techniques used to decipher and incriminate the wrongdoer. Through lab work, field trips, demonstrations by experts, and guest speakers, students explore major areas of forensic science: fingerprinting, blood typing, shoe and tire impressions, identification of hair, fibers and glass fragments, DNA; application of force and motion from blood splatters and tire skids; and forensic anthropology (the study of bone structures and features).

**IE308 Explorations in Mentorship**

One trimester
Credit: One unit additional elective credit.
Prerequisite: Third-trimester junior intending to register for IE405 Mentorship – Senior Research in senior year and selection by the Mentorship Coordinator based on Mentorship Application process.
Meeting pattern: Two periods per week.

Mentorship Explorations is for NCSSM junior students interested in doing off-campus research with a mentor during the senior year. This course serves
as an introduction to the mentorship experience in research and serves to develop skills needed for the mentorship. Students learn scientific methodologies, experimental design, and basic data analysis. Technical writing skills are also a major focus. Throughout the course, students read from the primary scientific literature and participate in discussion groups on current issues in research. As they explore potential research areas, students begin a portfolio of readings that relate to their particular area of mentorship interest. Students assist in the location of a mentor for the senior year.

**IE309a/IE309b Introduction to Entrepreneurship**
Two trimesters
Credit: Two units core elective credit.
Prerequisite: Permission of the Academic Programs Office.
Meeting pattern: One 100-minute evening class meeting.

Students receive a broad understanding of the field of entrepreneurship and are introduced to the important tools and skills necessary to create and grow a successful new venture. The course simulates the real life activities of entrepreneurs in the start-up stage of a new venture. Students, in teams, evaluate a new venture concept and determine if a demand exists for their product or service. Importantly, the course introduces students to successful entrepreneurs to learn from their process and errors as well as their successes.

**IE310 World Music**
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

This course is an exploration of the music and dance of various world cultures. Music and dance are universal forms of human artistic expression of the cultural values of every civilization. In each society, music and dance reflect the unique aesthetic, religious, philosophical, and/or governmental influences on that society. Music of a civilization is also strongly related to the tonal inflections of the local language. Primary areas of study include the music, dance, and societal values of India, the Middle East, Africa, Latin America, Native America, Europe, China, Japan, and Indonesia.

**IE312 History of Western Music**
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.
This course is a chronological survey of Western music, focusing primarily on the Baroque, Viennese, and Romantic. Students use music and listening as a vehicle to understanding theoretical and historical trends of each stylistic period. Overviews of the composers and their musical styles serve as a conceptual focus for the music that students examine in each historical period.

IE314 American Popular Song
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

American music of the twentieth century represents a unique interaction and collaboration of composers, lyricists, and musicians from European and African American cultures. The music of this period represents a truly “American” style that resulted from a cultural blend of musical theater with ragtime, blues, and jazz. This course focuses on social, musical, and technological factors that shaped this music. The course includes the study of music and lyrics through listening and class discussion, a survey of the great singers, composers, and lyricists of the time, as well as historical influences on and of American culture during the twentieth century.

IE316 Twentieth-century Music History
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

This course is a chronological survey of twentieth-century music, focusing primarily on the late Romantic era, Impressionism, Expressionism, Nationalism, Serialism, and twentieth-century American music. Students use music and listening as a vehicle to understanding theoretical and historical trends of each stylistic period. Overviews of the composers and their musical styles serve as a conceptual focus for the music that students examine in each historical period.

IE318 Shakespeare in Performance
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

This course aims to take the work of Shakespeare from the page to the stage. Students read Shakespearean texts through the lens of the theater artist, synthesizing textual analysis and the creative mind and applying the
product to a practical theatrical setting. We consider the classical performance of these plays in their historical Elizabethan context, but our main focus is modern adaptation and staging for film and theater. Thematic and cultural readings of Shakespeare’s work give way to close character study, staging, and concerns in theatrical design (set, props, costumes, etc.) as we investigate the way an audience experiences these plays. Principles of acting and theatrical production are covered, and students work to translate their unique vision of the plays to stage performances through scene work and design projects.

**IE320 Science, Math, and Theater**
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

If “it’s the wanting to know that makes us matter,” as Tom Stoppard suggests in *Arcadia*, it’s small wonder that the struggles of science and math to unlock the secrets of the universe have proven to be such fertile ground for playwrights and directors. In this page-to-stage class, we examine how works for the stage have wrestled with the philosophical implications and at times controversial repercussions of mathematical and scientific discovery. After a close reading and analysis of plays that may include Stoppard’s *Arcadia*, Brecht’s *Galileo*, and Steve Martin’s *Picasso at the Lapin Agile*, we take calculation and experimentation out of the lab and onto the stage as we explore the choices a theatrical artist must make when staging his or her interpretation of these works. Final projects are developed in consultation with the instructor and may include essays, scene work, or theatrical design projects.

**IE350 Medical Ethics and Leadership**
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

Students study ethics and its relation to leadership in solving issues raised in areas such as genetic engineering, research on humans, cloning, neuroscience, emergent infectious diseases, and euthanasia. Course materials include a variety of readings, films, and speakers. Extensive use is made of discussion and seminars. Each student also participates in a problem-based learning case study.

**IE352 Environmental Ethics and Leadership**
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

Students study ethics and its relation to leadership in solving issues raised in areas such as population growth, water and energy resources, environmental pollution, third world development, environmental justice, and genetic engineering of crops. Course materials include a variety of readings, films, speakers, and field trips. Extensive use is made of discussion and seminars. Each student also participates in a leadership development project.

**IE358 Phenomenology: Husserl, Cantor, Jung**

One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

What is awareness? How is dreaming different from ordinary awareness? What does mathematics have to do with awareness? Are different kinds of awareness related? In this course, we explore these and other questions as we engage in a seminar-style study of what is commonly spoken of as “mind, soul, spirit, or consciousness” – not as a biochemical product or metaphysical construct but rather as moments lived in time. Through reflection, reading, class discussion, and writing short papers, we experience perceiving, remembering, expecting, feeling, dreaming, and other modes of awareness as they are lived in moments of a transfinite continuity. Readings include *The Phenomena of Awareness: Husserl, Cantor, Jung* by C. Tougas (Routledge: 2013) and references to Plato, Aristotle, Saint Augustine, Søren Kierkegaard, Georg Cantor, Edmund Husserl, Edith Stein, Albert Camus, C. G. Jung, and Jacki Schectman.

**IE360 Global Understanding**

One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of at least two trimesters of AS303 Writing and American Studies or AS305 American Studies.
Meeting Pattern: Four periods per week including lab. Since meetings of this course must be coordinated with schools in other countries, the meeting pattern may include one or more weekly evening class meetings, to be announced prior to registration.

In this course, designed to bring a global experience to NCSSM students, we develop and foster cross-cultural understanding in partnership with students in other parts of the world. Through a shared virtual classroom, we explore our cultural differences and similarities in dialogue with students and faculty at schools in countries other than the United States.
We engage in discussions about family and gender roles, cultural values, religion, education, work, economics, politics, and environmental issues, as well as myriad other subjects that will help us gain a deeper understanding of our global community. Real-time small group videoconferencing and partnered individual text chat are part of every class. Students help to develop the key themes and modes of inquiry for this course. Drawing on research that they conduct during this course, material they have explored in their American Studies classes, as well as their own observations and experiences as American students, students share with their international peers aspects of American culture, history, society, economics, and politics and, in turn, are taught by their international student partners about their own countries and cultures. Students keep a journal and complete a number of written assignments asking them to reflect on and to think critically about the information and experiences they glean from their cross-cultural discussions. The course culminates in projects that students create in collaboration with their international partners. Students not only deepen their understanding of their own and others’ cultures but also become more aware of how increasingly interconnected the world has become, and the important roles they play as responsible and caring global citizens.

**IE390 Research Experience in the Humanities**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Three periods per week including lab.*

This interdisciplinary course introduces students to the rigorous pleasures of research in the humanities. Through work in and out of class, including visits by guest lecturers and trips to local archives and museums, students learn the basic skills of research, including the identification of a compelling intellectual interest and the transformation of that interest into a question that at once requires and excites research of the highest quality. Students then answer this question, in a provisional way, by work that leads first to the statement of a thesis (the answer to the question), then to the initial development of that statement in a shorter paper of ten to twelve pages. Successful completion of the course may also lead to summer internships or apprenticeships with local scholars. Following this course, optional enrollment in IE490 Research in the Humanities offers selected students the opportunity for more substantial work in the chosen fields of scholarship.
IE402 Introduction to Applied Chemistry and Engineering
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of A- or higher in CH305 Chemistry by Inquiry, CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry (I), or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.
Meeting pattern: Five periods per week including lab.

This multi-disciplinary course introduces students to the global chemical industry from a chemical, engineering, economic, and historical viewpoint. Major topics covered in the course include an economic overview of the chemical industry, major chemical production routes, chemical engineering concepts, the product development process, and an analysis of major chemical industry sectors. The laboratory section involves a full-term product development lab that requires students to work in groups to produce a marketable chemical product.

IE405a/IE405b Mentorship – Senior Research
Two trimesters
Credit: Two units core elective credit.
Prerequisite: Senior standing, completion of IE308 Mentorship Explorations with a grade of A- or higher, and permission of the Academic Programs Office.
Meeting pattern: Seven periods per week including two labs.

Mentorship – Senior Research is for senior students interested in doing research under the guidance of a mentor at one of the local universities or Research Triangle companies. Students spend two afternoons each week developing a research proposal, learning appropriate lab protocols for the research, collecting data and analyzing the data under the supervision of the mentor(s). Students are expected to keep a journal of their mentorship experiences, research protocols, data if not kept at the mentorship site, and individual readings log. Each student writes a formal review of the literature in the first trimester and a scientific paper based on the research project in the second trimester of work. Students are required to present the outcome of their work at one or more of the following via poster and/or oral presentation: NC Student Academy of Science, Junior Science and Humanities Symposium, and/or the NCSSM Research Symposium.

IE406 Mentorship – Extended Research
One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of IE405 Mentorship – Senior Research and permission of the Vice Chancellor for Academic Programs.
Meeting Pattern: Seven periods per week including two labs.

This course is intended for mentorship students whose research presents the opportunity for a full additional term of work. Students must apply to the Vice Chancellor for Academic Programs by not later than three weeks before the end of the prior term. The Vice Chancellor reviews the application and determines if a faculty member is available and has the necessary expertise to supervise the student’s continued research. The application includes: written commitment from the mentor to work with the student for a full additional term, description of work already completed by the student, specific goals for the additional term of mentorship, schedule of days and times student will work with the mentor, and how the student is to be graded. A description of transportation arrangements must also be included. Transportation is typically the responsibility of the mentor or the student’s family, although other means of transportation may be approved.

IE442 Research in Computational Science I
One trimester
Credit: One unit core elective credit.
Prerequisite: Second-trimester junior standing or senior standing, and permission of the Dean of Science.
Meeting pattern: Five periods per week including lab.

This is an advanced course for senior students or second-trimester junior students with the maturity, independence, and motivation necessary to conduct their own research project. Students learn computational methodology and design while conducting a variety of computational projects on a small scale. Students then write their own research proposals on a problem of interest to them. Throughout the trimester students read from the primary scientific literature and participate in discussion groups on current issues in computational science research. Based on the outcomes of the trimester’s work, students may be given an opportunity to participate in summer research programs on campus or in the Triangle area. Students with a final grade of B or higher are encouraged to continue in IE444 Research in Computational Science II.

IE444 Research in Computational Science II
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of B or higher in IE442 Research in Computational Science I or successful participation in a summer research program, and permission of the Dean of Science.
Meeting pattern: Five periods per week including lab.

In this course, students continue to conduct computational research based on their previous trimester and/or summer work. Time is devoted to the completion of the research project and a written paper. Students are required to present their results at the NCSSM Research Symposium and are encouraged to present their research at the North Carolina Student Academy of Science competition and at other state and national competitions.

IE446 Research in Computational Science III
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of B or higher in IE444 Research in Computational Science II and permission of the Dean of Science.
Meeting pattern: Five periods per week including lab.

In this course, students continue work on their previous research to produce additional data and analysis, as needed, or to research extension questions based on their original work. Students in this course have a leadership role in working with the junior students enrolled in IE442 Research in Computational Science I and may serve as teaching assistants.

IE448 Research in Computational Science IV
One trimester
Credit: One unit core elective credit.
Prerequisite: Final grade of B or higher in IE446 Research in Computational Science III and permission of the Dean of Science.
Meeting pattern: Five periods per week including lab.

In this course, students continue work on their previous research to produce additional data and analysis, as needed, or to research extension questions based on their original work. Students in this course have a leadership role in working with the junior students enrolled in IE442 Research in Computational Science I and may serve as teaching assistants.

IE450 Applications in Entrepreneurship
One trimester
Credit: One unit core elective credit.
Prerequisite: Selection by the proposal evaluation committee.
Meeting pattern: One 2-hour evening class meeting.

“Entrepreneurs are simply those who understand that there is little difference between obstacle and opportunity and are able to turn both to their advantage” – Victor Kiam. This course provides the necessary background material and a structured opportunity for students with ideas for products or services to bring their ideas from conception to market through this real-life activity of entrepreneurship. A thematic focus for the products or services is announced each year. Students submit their thematically-related ideas to a proposal evaluation committee which reviews the applications and selects the student teams for that year’s enrollment. Students then learn and apply the steps involved in marketing their ideas including market analysis, business plan development, and presentation to potential investors. At the conclusion of the term, student team(s) may be invited to continue their work as a Special Study Option for an additional term.

IE490 Research in the Humanities
One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of IE390 Research Experience in the Humanities and permission of the Dean of Humanities.
Meeting pattern: Three periods per week including lab.

In this course, students engage in research designed to answer the substantive questions they posed in previous studies in a topic of interest. Students learn how to construct an effective thesis statement that will govern an argument developed and sustained throughout a paper of twenty to twenty-five pages. Attention is given equally to the form of the research paper and to its content, from the larger questions of the argument’s structure to the more local matters of the sentences in which that argument is specifically conducted. The proper use of evidence, as well as considerations of its evidentiary nature, are also fundamental to the course’s concerns. As in IE390, this course involves travel beyond the imaginative work of the class to local archives and museums. Students present their research at NCSSM’s annual Research Symposium and may also present at the Junior Science and Humanities Symposium. In addition, they explore opportunities for publication.

NCSSM Online and the Residential Program
In August of 2008, NCSSM launched its virtual learning program, NCSSM Online, designed to expand the reach of the school beyond the Durham campus. Like the residential program, NCSSM Online has a competitive admissions process. Through NCSSM Online more of North Carolina’s high achieving students are able to participate in NCSSM’s challenging opportunities through a “blended” program of online instruction and campus visits. NCSSM Online courses are offered in addition to or as part of a student’s academic course schedule at their home high school.

When space permits, there may be opportunities for residential students to enroll in an NCSSM Online course. Generally, these are NCSSM Online courses that are not offered in the residential program and residential students are permitted enrollment in no more than one NCSSM Online course each semester. The residential program operates on a trimester calendar while NCSSM Online operates on a semester calendar. Therefore, residential students requesting to enroll in an NCSSM Online course must have approval from the Vice Chancellor for Academic Programs to ensure that their academic record indicates an ability to be successful with an academic overload for part of winter term (the overlap of the NCSSM Online fall semester and the second trimester of the NCSSM residential program). The program also requires that students commit to a weekly webinar class meeting at a scheduled time. Enrolled students are also required to attend, in person, one or two “Online Saturdays” along with the enrolled NCSSM Online students (usually during the residential program’s extended weekends). Due to these special requirements, residential students enrolled in an NCSSM Online course must submit a Commitment Form, signed by themselves, their advisor, and their parents. Junior students in the NCSSM residential program are not permitted to enroll in fall semester NCSSM Online classes, but may be eligible to enroll in spring semester classes, which begin partway through the residential winter term.

Listed below are some of the NCSSM Online courses in which residential students have been able to enroll in recent years. The actual availability and enrollment procedures for residential students are announced as part of the Course Enrollment process each year.

**BI430 Advanced Topics in Environmental Science**  
*One Semester*  
*Credit:* One unit core biology or core elective credit.  
*Prerequisite:* Permission of the Vice Chancellor for Academic Programs.  
*Meeting pattern:* Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.
Course description, detailed pre-requisites, and other information: http://online.ncssm.edu/course-list

NOTE: Due to the variation of the residential trimester calendar and the NCSSM Online semester calendar, BI430 Advanced Topics in Environmental Science in the NCSSM Online program is not an acceptable prerequisite for BI426 AP Environmental Science (II) in the residential program.

BI432 AP Environmental Science
One Semester
Credit: One unit core biology or core elective credit.
Prerequisite: BI430 Environmental Science Advanced and permission of the Vice Chancellor for Academic Programs.
Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed pre-requisites, and other information: http://online.ncssm.edu/course-list

NOTE: Due to the variation of the residential trimester calendar and the NCSSM Online semester calendar, BI424 AP Environmental Science (I) in the residential program is not an acceptable prerequisite for BI432 AP Environmental Science in the NCSSM Online program.

CH412 Introduction to Computational Chemistry
One Semester
Credit: One unit core engineering/technology or core elective credit.
Prerequisite: Permission of the Vice Chancellor for Academic Programs.
Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed pre-requisites, and other information: http://online.ncssm.edu/course-list

CH414 Introduction to Medicinal Chemistry
One Semester
Credit: One unit core elective credit.
Prerequisite: Permission of the Vice Chancellor for Academic Programs.
Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed pre-requisites, and other information: http://online.ncssm.edu/course-list
CS308 Scientific Programming
One Semester
Credit: One unit core engineering/technology or core elective credit.
Prerequisite: Permission of the Vice Chancellor for Academic Programs.
Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed pre-requisites, and other information:
http://online.ncssm.edu/course-list

EN364 Ecocriticism: Nature in Thought and Writing
One Semester
Credit: One unit core elective credit.
Prerequisite: Permission of the Vice Chancellor for Academic Programs.
Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed pre-requisites, and other information:
http://online.ncssm.edu/course-list

IE362 Forensic Accident Investigation and Material Evidence
One Semester
Credit: One unit core elective credit.
Prerequisite: Permission of the Vice Chancellor for Academic Programs.
Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed pre-requisites, and other information:
http://online.ncssm.edu/course-list

IE380 Bioinformatics – Computational Biology
One Semester
Credit: One unit core engineering/technology or core elective credit.
Prerequisite: Permission of the Vice Chancellor for Academic Programs.
Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed prerequisites, and other information:
http://online.ncssm.edu/course-list

IE404 Green Environmental Geology
One Semester
Credit: One unit core elective credit.
Prerequisite: Permission of the Vice Chancellor for Academic Programs. Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed pre-requisites, and other information: http://online.ncssm.edu/course-list

**SS350 Introduction to Western Political Thought**
One Semester
Credit: One unit core elective credit.
Prerequisite: Permission of the Vice Chancellor for Academic Programs. Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed pre-requisites, and other information: http://online.ncssm.edu/course-list

**SS354 Twenty-First Century Media Studies**
One Semester
Credit: One unit core elective credit.
Prerequisite: Permission of the Vice Chancellor for Academic Programs. Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.

Course description, detailed pre-requisites, and other information: http://online.ncssm.edu/course-list

**Mini-Term**
Mini-Term is another means by which NCSSM provides significant opportunities for students to engage in unique educational experiences outside of the regular school curriculum and beyond the traditional classroom context. During Mini-Term, in the place of regular classes, students choose between two stimulating academic options: either participate in one of the specialized mini-courses arranged by one or more NCSSM faculty members, or conduct an approved educational project of the student’s own design with the sponsorship of an adult member of the NCSSM community. The goal is to support students in a rigorous exploration of a subject area of great interest to them in a way that contributes to their academic and personal growth and serve them well in their future academic aspirations. Successful completion of Mini-Term in both the junior and the senior year is a requirement for graduation from NCSSM.
**Student Development Courses**
The residential environment of NCSSM affords a unique opportunity to contribute to the development and well-being of the whole student both through the experience of community living, and through specific curricular offerings and service experiences described in this section.

**Graduation Requirement in Physical Activity and Wellness**
All junior students are required to successfully complete a term of either VS Varsity Sports or another activity-based PA course. Courses under Sport Education and Training (SE courses) do not meet NCSSM graduation requirements in physical activity and wellness. Students who enter NCSSM with a deficiency of physical activity credit must also successfully complete an additional term of physical activity/wellness for each .50 unit of deficiency. Such deficiencies may be satisfied by either additional terms of VS Varsity Sports or one, or more, activity-based course(s), though courses may not be repeated for credit. NOTE: Though students may be involved in a varsity sport each term, they receive credit for VS Varsity Sports only once unless satisfying a documented entering credit deficiency in physical activity.

**VS Varsity Sports**
*One trimester*
**Credit:** One unit physical activity credit.
**Prerequisite:** Selection by the NCSSM coach to the varsity sport team through normal team-selection procedures. Prior junior varsity or varsity experience in the sport of choice is recommended.
**Meeting pattern:** Practices are typically held Mondays through Fridays 4:30pm – 6:30pm. Competitions vary according to sport by day of week and starting time.

These courses are a way for students who engage in the recommended amount of weekly exercise for a healthy lifestyle through an NCSSM Interscholastic Varsity Sport to meet the NCSSM physical activity/wellness graduation requirement or to satisfy an entering credit deficiency in physical activity from 9th/10th grade. Instruction in each sport is geared to developing a high functional level of physical fitness through cardiovascular exercise, resistance training and drills; knowledge of the rules, techniques, and strategies of the sport; and the athletic ability to execute them in an interscholastic competition. Students registered for VS Varsity Sports must be selected by the coach to be on the team and must participate in a minimum of three practices/competitions per week during the sport’s season. Students unable to meet these requirements for any reason (poor academic performance in other courses, medical, or disciplinary reasons) will be dropped from VS Varsity Sports and must meet
the NCSSM physical activity/wellness requirement by completing another activity-based PA course.

NOTE: Though students may be involved in a varsity sport each term, they receive academic credit for VS Varsity Sports only once unless satisfying an entering credit deficiency in physical activity. Creditable Varsity Sports include:

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<tr>
<th>FALL VARSITY SPORTS</th>
<th>WINTER VARSITY SPORTS</th>
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<tr>
<td>VS102 Men’s Soccer</td>
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<td>VS104 Women’s Volleyball</td>
<td>VS124 Women’s Basketball</td>
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<td>VS106 Women’s Tennis</td>
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<td>VS132 Indoor Track</td>
<td>VS152 Track and Field</td>
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**PA102 – PA126 Individual and Team Sports**

*One trimester each*

*Credit:* One unit each physical activity or additional elective credit.

*Meeting pattern:* One period per week including lab.

Courses listed below provide instruction in the history of the game, basic skills and fundamental techniques, rules, etiquette, tactics, strategy, and scoring. Emphasis is placed on student safety and proper care of equipment. Through individual and/or group practice and opportunities for play, students develop skill in the sport. Instruction is geared to beginners, so students are not required to have previous knowledge of the sport or experience playing the sport. However, students are expected to make a full commitment to learning the game and developing physical skill in the sport. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

PA102 Disc Golf
PA104 Archery
PA108 Ultimate Frisbee
PA112 Tennis
PA118 Racquetball
PA120 Volleyball
PA126 Badminton

**PA128 Fit for Life**  
*One trimester*  
*Credit:* One unit physical activity or additional elective credit.  
*Meeting pattern:* One period per week including lab.

This course is for those who are serious about getting in shape through extremely rigorous exercise. The curriculum is modeled after the P90X workout system and focus is on overall toning and strengthening of the entire body. Every two weeks students participate in a different workout including resistance training, plyometrics, kickboxing, pilates, abdominal exercises, cardio strengthening, and yoga. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General's recommendation of three moderate exercise sessions weekly.

**PA130 Mountain Biking**  
*One trimester*  
*Credit:* One unit physical activity or additional elective credit.  
*Meeting pattern:* One period per week including lab.

This course provides students with an opportunity to explore the outdoors of North Carolina while participating in physical fitness activities. Students learn to successfully ride on the road, greenways, and light terrain trails. The class includes traveling to local-area trails for cycling. Bicycles are provided to students enrolled in this class. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA132 Broadway Dance**  
*One trimester*  
*Credit:* One unit physical activity or additional elective credit.  
*Meeting pattern:* One period per week including lab.

This course introduces students to the history and dances of some of the most famous Broadway musicals. The focus is on musicals from the 1950's to the present day. Students participate each week in technique classes. Students learn the historical context of musicals and research a topic in
musical theater. Students have the opportunity to choreograph their own Broadway dance. No previous dance experience is necessary. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA134 Advanced Dance Techniques I**  
*One trimester*  
*Credit:* One unit physical activity or additional elective credit.  
*Meeting pattern:* One period per week including lab.

This course is for students with at least five years of dance experience. The focus is on refinement of technical skills in modern dance and ballet and jazz at the advanced level, including complex movement capabilities, rhythmic structures, and spatial designs, with emphasis on aesthetic and expressive qualities that lead to performance. Progressively more sophisticated aspects of space, time, and energy are explored. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly. Students may take this course and/or PA154 Advanced Dance Techniques II or PA164 Advanced Dance Techniques II in any order. None is prerequisite for the others.

**PA136 Hiking**  
*One trimester*  
*Credit:* One unit physical activity or additional elective credit.  
*Meeting pattern:* One period per week including lab.

This course provides students with an opportunity to explore the outdoors of North Carolina while participating in physical fitness activities. Learn about proper hiking gear, basics for safety, trip plans, and how to research trails in the local area. The class includes traveling to local-area trails for hikes. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA138 Dance Appreciation**  
*One trimester*  
*Credit:* One unit physical activity or additional elective credit.  
*Meeting pattern:* One period per week including lab.
This course introduces students to the fundamentals of ballet, modern, jazz, hip hop, improvisation, choreography, and social and international folk dance. This is a broad overview of dance as an art form. Students learn how one technique evolved into the next. Students participate each week in technique classes incorporating international folk dance, social dance, ballet, modern, jazz, and hip hop. This course familiarizes students with practices, philosophies, terminologies, and styles of dance. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA140 Self Defense**
*One trimester*
*Credit: One unit physical activity or additional elective credit.*
*Meeting pattern: One period per week including lab.*

This course introduces students to personal safety and awareness. Topics of study include the recognition of dangerous situations and instruction in basic self defense moves and counters. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA142 Weight Training for Sports and Fitness**
*One trimester*
*Credit: One unit physical activity or additional elective credit.*
*Meeting pattern: One period per week including lab.*

This course provides instruction in the fundamental techniques, principles, and concepts in weight training. Emphasis is on utilizing proper form with each exercise involving resistance to safely obtain increased muscle tone, endurance, strength, or power. Besides performing weight training to become toned, shaped, or stronger, students can design and execute a program specifically geared to enhancing performance in a sport, or to meet other personal fitness goals. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA144 Zumba**
*One trimester*
*Credit: One unit physical activity or additional elective credit.*
*Meeting pattern: One period per week including lab.*
This course is for students who want to have fun while working out. Zumba is a dance-fitness program that combines traditional Latin dance styles, including salsa, mambo, cha-cha, cumbia and merengue, as well as hip-hop and belly dancing. During each class, students participate in a high energy cardiovascular aerobic workout followed by strength training, abdominal workouts and stretching. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA146 Pilates and Yoga I**  
*One trimester*  
*Credit:* One unit physical activity or additional elective credit.  
*Meeting pattern:* One period per week including lab.

Students learn the fundamentals of the Pilates method of exercise, along with basic Yoga movements and poses. Both systems of movement emphasize the use of breath to support mindful movement that develops strength and flexibility. The Pilates mat work is especially effective in the development of core strength, while the Yoga emphasizes flow, balance, and flexibility. No previous experience with Pilates or Yoga is required. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA148 Introduction to Fitness**  
*One trimester*  
*Credit:* One unit physical activity or additional elective credit.  
*Meeting pattern:* One period per week including lab.

This course is for those who are new to regular exercise and interested in developing an individual exercise program. The curriculum includes kickboxing, jogging, biking, aerobics, weight lifting, and circuit training. The focus is on overall toning and strengthening of the entire body. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA150 Studio to Stage**  
*One trimester*  
*Credit:* One unit physical activity or additional elective credit.
Meeting pattern: One period per week including lab.

This course is for students who are interested in performing in our annual dance concerts. The focus is on dance technique and choreography. No experience necessary. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA152 Ballet**  
*One trimester*  
*Credit: One unit physical activity or additional elective credit.*  
*Meeting pattern: One period per week including lab.*

This course is for students who are interested in ballet. Students learn coordination, musicality, and strength as well as ballet history, vocabulary, and choreography. No experience necessary. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA154 Advanced Dance Techniques II**  
*One trimester*  
*Credit: One unit physical activity or additional elective credit.*  
*Meeting pattern: One period per week including lab.*

This course is for students with at least five years of dance experience and is a continuation of PA134 Advanced Dance Techniques I, although PA134 is not a prerequisite for this class. The focus is on further refinement of technical skills in modern dance and ballet and jazz at the advanced level, including complex movement capabilities, rhythmic structures, and spatial designs, with emphasis on aesthetic and expressive qualities that lead to performance. Progressively more sophisticated aspects of space, time, and energy are explored. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly. Students may take this course and/or PA134 Advanced Dance Techniques I or PA164 Advanced Dance Techniques III in any order. None is prerequisite for the others.

**PA156 Pilates and Yoga II**  
*One trimester*
Credit: One unit physical activity or additional elective credit.
Prerequisite: PA146 Pilates and Yoga I.
Meeting pattern: One period per week including lab.

This course is for students who have already taken PA146 Pilates and Yoga I. Students learn advanced Pilates matwork as well as standing Pilates, along with intermediate and advanced Yoga movements and poses. Both systems of movement emphasize the use of breath to support mindful movement that develops strength and emphasizes flow, balance, and flexibility. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA158 Couch to 5K**
One trimester
Credit: One unit physical activity or additional elective credit.
Meeting pattern: One period per week including lab.

This course is for students who are ready to get in shape through running. The focus is on cardio strength as well as overall body toning. Each class consists of walking and/or running followed by strength training, abdominal exercises, and stretching. Students are expected to be able to run a 5K by the end of the trimester. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA160 Circuit Training**
One trimester
Credit: One unit physical activity or additional elective credit.
Meeting pattern: One period per week including lab.

This course is designed for students interested in discovering an exciting way to workout and stay in shape. Circuit training combines strength training with high intensity cardiovascular exercises in a variety of combinations to target all muscle groups. Participants move quickly from one exercise to the next so there is no time for boredom. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly.

**PA162 Rock Wall Climbing**
One trimester
Credit: One unit physical activity or additional elective credit.
Meeting pattern: One period per week including lab.

This course provides instruction in safe climbing skills. Learn about the indoor climbing wall in the Physical Education Center, different types of climbing, and basic climbing concepts and practices. As a part of the safe climbing component, we teach proper top rope belay technique, as well as correct use of harnesses and the figure-8-follow-through knot. All equipment is provided for this class. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General's recommendation of three moderate exercise sessions weekly.

PA164 Advanced Dance Techniques III
One trimester
Credit: One unit physical activity or additional elective credit.
Meeting pattern: One period per week including lab.

This course is for students with at least five years of dance experience and is a continuation of PA154 Advanced Dance Techniques II, although PA154 is not a prerequisite for this class. The focus is on further refinement of technical skills in modern dance and ballet and jazz at the advanced level, including complex movement capabilities, rhythmic structures, and spatial designs, with emphasis on aesthetic and expressive qualities that lead to performance. Progressively more sophisticated aspects of space, time, and energy are explored. Students meet in class weekly for 90 minutes and are expected to participate in two additional weekly exercise sessions beyond the class meeting to comply with the Surgeon General’s recommendation of three moderate exercise sessions weekly. Students may take this course and/or PA134 Advanced Dance Techniques I or PA154 Advanced Dance Techniques II in any order. None is prerequisite for the other.

Sport Education and Training
Some of these courses (SE352 and SE402) meet core elective requirements while the others are additional elective courses and they offer students the opportunity to explore topics related to delivery and support of sport and physical education curriculums. These courses do not meet the NCSSM graduation requirement for activity-based physical activity credit.

SE160 Sports Medicine I
One trimester
Credit: One unit additional elective credit.
Meeting pattern: One period per week including lab.

Students are introduced to the field of athletic training. Topics of study include basic anatomy/physiology, athletic training skills, and the recognition, management, and rehabilitation of common athletic injuries.

**SE162 Sports Medicine II**
One trimester
Credit: One unit additional elective credit.
Prerequisite: SE160 Sports Medicine I.
Meeting pattern: One period per week including lab.

This course is a continuation of SE160 Sports Medicine I and may be of special interest to students who are contemplating a career in medicine. Topics include an in-depth study of the prevention, recognition, management, and rehabilitation of common athletic injuries.

**SE352 Emergency Care of Illness and Injuries I**
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

This course prepares students to recognize and respond appropriately to cardiac, breathing, and First Aid emergencies. Students learn skills necessary to give immediate first aid and CPR or breathing until more advance medical personnel arrive and take over. We look at environmental conditions, mechanics and classification of injury, bloodborne pathogens and taking action. Along with the anatomy of injuries and preventive measures, students also learn how to take blood pressure, pulses and respiration.

**SE402 Emergency Care of Illness and Injuries II**
One trimester
Credit: One unit core elective credit.
Prerequisite: SE352 Emergency Care of Illness and Injuries I
Meeting pattern: Three periods per week including lab.

This course continues instruction, begun in SE352, in the proper response to cardiac, breathing, and First Aid emergencies. Along with learning the anatomy and immediate care of injuries and emergency situations of different sections of the body, we discuss shoulder, knee, elbow etc. The course considers equipment that could be applied help reduce injuries
along with devices to assist in caring for an individual, such as spine board and air splints. We conclude with concussion assessment.

**Graduation Requirement in Student Life**
All students are required to successfully complete two residential education courses in junior year, including RE102 Residential Education, and to complete a total of four residential education courses over the two years. Residential Education courses are graded using NCSSM’s letter-grade scale (see page 5 *Quality Points and GPA*), though the grade does not compute in the GPA. All students must also successfully complete two years of WS105 Work Service and must meet the SSL105 Summer Service Learning requirement before the start of their senior year at NCSSM. These courses are all graded Satisfactory/ Unsatisfactory (S/U) and do not compute in the GPA.

**RE102 Residential Education**
One Trimester
Credit: One unit residential education credit,
Meeting pattern: One period per week.

Using a holistic education approach of self-discovery, self-realization, and wellness, this course helps students integrate into the life and culture of NCSSM and to establish the foundation necessary for academic and personal success in the classroom, in relationships, and in community living at NCSSM and beyond. Topics include time management, conflict management and healthy relationships, diversity, and resume-writing and interview skills.

**RE110 Exploring Multicultural America**
One Trimester
Prerequisite: RE102 Residential Education.
Credit: One unit residential education credit.
Meeting pattern: One period per week.

This course explores how issues of race, culture, class, gender, sexual orientation, gender identity, and disability interact to form the diverse nation in which we live. Students learn the history of prejudice, discrimination, power, and privilege in the United States and discuss the impact it has on today’s society. Students also reflect on their own experiences, identities and biases and how each has shaped their own worldview.

**RE112 Public Speaking I**
One Trimester
Prerequisite: RE102 Residential Education.
Credit: One unit residential education credit.
Meeting pattern: One period per week.

Public speaking aims to inform, convince, influence, persuade, or entertain a group of people. The development of public speaking skills, valuable in itself, can also contribute to one’s self-confidence, organizational skills, listening skills, and anxiety-management. In this course, students learn to write and deliver effective speeches. This includes learning the effective use of presentation aids, supporting arguments, communication ethics, and speech organization. Successful completion of this course prepares the student for RE114 Public Speaking II.

**RE114 Public Speaking II**
One Trimester
Credit: One unit residential education credit.
Prerequisite: RE112 Public Speaking I.
Meeting pattern: One period per week.

In this course, students continue the development of speaking skills begun in RE112 Public Speaking I. Students study and practice the principles of delivering strategic, confident, and credible speeches. Students learn to develop arguments, analyze audiences, and use humor and persuasion ethically and effectively. Through a variety of oral presentations, students enhance their abilities to deliver persuasive and special-occasion speeches.

**RE116 Marketing You**
One Trimester
Credit: One unit residential education credit.
Prerequisite: RE102 Residential Education.
Meeting pattern: One period per week.

This course utilizes discussion and cooperative learning experiences to help students identify their strengths and learn how to best market themselves in the professional world. Focus is on using social media as a tool to identify promising career options, writing an effective resume, and learning techniques for professional interviews.

**RE118 Excellence in Leadership**
One Trimester
Credit: One unit residential education credit.
Prerequisite: RE102 Residential Education.
Meeting pattern: One period per week.

As stated in the Disney Organizational Leadership (DOL) course description: “. . . as important as theory and application are to the learning process, it all begins with the heart and character of the leader.” Based on concepts from the (DOL) course, students assess their own leadership styles and practice various leadership techniques. Students examine the type of leadership required to create and maintain high levels of excellence on the individual level and in small group, organizational, and community environments.

**RE120 Financial Planning**
One Trimester
Credit: One unit residential education credit.
Prerequisite: RE102 Residential Education.
Meeting pattern: One period per week.

Many high school and college graduates find themselves in serious financial trouble and in a debt cycle that can be difficult to reverse, causing the deferment or loss of some of their plans and dreams. Learning some simple and sound money management skills during high school can help students take charge of their financial future and can help set them on the path to realizing their important life goals. In this course, students learn basic money management skills such as budgeting, borrowing, earnings, investing, financial services, identity protection, and insurance. We teach practical application of these skills that students can put to immediate use.

**SSL105 Summer Service Learning**
Credit: Service Learning graduation credit.
60 hours in summer between junior and senior year or in summer prior to first enrollment at NCSSM.

This experience introduces students to service learning. Students work for a non-profit organization in their home community. Students maintain a daily journal of their experiences, interview staff members of the organization, and share with other members of the NCSSM community in a small group reflection session based on their experiences.

**WS105a/WS105b/WS105c Work Service**
Three trimesters each year
Credit: Work service graduation credit.
Meeting pattern: Three hours per week.
Students are introduced to professional work expectations while assisting NCSSM departments three hours per week. Students are trained in the specific functions of their assigned area. Students receive opportunity for constructive evaluation and mentoring.

**STUDY OPTIONS and SPECIAL PROGRAMS**

**Individualized Study**
Credit: Same as established for the regular course.
Grading: A, B, C, D or S, U as established in the regular course.
Prerequisite: Approval by the instructor of the course, Academic Dean, Advisor and Vice Chancellor for Academic Programs.

Individualized Study is a contract between a student enrolled in a course in the regular curriculum and the teacher of that course which allows students to move at their own pace and style through the course.

**Independent Study**
Credit: ½ unit of non-core elective credit.
Grading: A, B, C, D or S, U as established at time of registration.
Prerequisite: Approval of sponsoring member of the faculty, Academic Dean, Advisor and Vice Chancellor for Academic Programs.

Independent Study is available to any student who wishes to explore a topic or area of interest not offered in the regular curriculum. The student and the instructor together design the program of study and determine the number and frequency of meetings and the amount of credit to be earned. This option is available in all disciplines with the scope of the program left to the discretion of the instructor.

**Seminar**
Credit: ½ unit of non-core elective credit.
Grading: A, B, C, D or S, U as established at time of registration.
Prerequisite: Approval of sponsoring member of the faculty, Academic Dean, Advisor and Vice Chancellor for Academic Programs.

A group of students and a faculty sponsor meet at specified times to focus on a particular aspect of a discipline outside of the regular curriculum. Primary responsibility for researching the topic and reporting in sessions rests with the students, under the guidance of the sponsor.

*Students may not use Independent Study or Seminar Options to replace units of graduation credit needed for a core elective graduation requirement, for an exempted NCSSM requirement, or for Grade 9 or 10*
missing units of credit. Graduation credit for Individualized Study is credited as for the regular course.

GRADUATION REQUIREMENTS
The chart on the next page serves as a reference for the Board-approved graduation requirements described in the NCSSM Student Handbook. Graduation requirements noted here are minimum credit requirements for graduation from NCSSM. Students earn these credits, and more, over six trimesters of full enrollment at NCSSM. Full enrollment equals four core courses in fall of junior year and five core courses each term after that. In extenuating circumstances, students may be able to add an additional core course in any given term or may be approved for less than a full course load. Additionally, to be eligible for graduation, students must earn a final grade of C-/S or higher in all core, core elective, and other required courses and required educational activities. Students who earn a D/U in a core, core-elective, or other required course or required educational activity must retake and pass that course/activity or an approved replacement course/activity, or successfully complete the Summer Academic Recovery Program, in order to be eligible for graduation.

Graduation requirements may be modified for students who qualify for exemption from one, or more, NCSSM subject requirements. Criteria for exemption follows the Graduation Requirements chart and includes requirements for those students who qualify for exemption in the particular subject area.
GRADUATION REQUIREMENTS REFERENCE CHART

<table>
<thead>
<tr>
<th>Minimum credits from 9th/10th grade</th>
<th>Subject Area</th>
<th>Minimum Trimester Credits to be earned at NCSSM</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Engineering/Technology</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>English</td>
<td>5</td>
<td>Three of these credits are earned in the required AS303 or AS305. Two additional credits are earned in 400-level core English courses, usually in senior year.</td>
</tr>
<tr>
<td>1</td>
<td>History/Social Science</td>
<td>3</td>
<td>These credits are earned in the required AS303 or AS305.</td>
</tr>
<tr>
<td>2</td>
<td>Mathematics</td>
<td>5</td>
<td>These credits must include completion of MA305 or MA355, or higher, at NCSSM.</td>
</tr>
<tr>
<td>1</td>
<td>Science</td>
<td>6</td>
<td>Two trimester credits each in biology, chemistry, and physics, regardless of prior study.</td>
</tr>
<tr>
<td>0</td>
<td>World Language</td>
<td>3 or 6</td>
<td>Three trimester credits are required in junior year and total credits earned must include the Intermediate Level or higher at NCSSM.</td>
</tr>
<tr>
<td>1</td>
<td>Core Electives</td>
<td>Varies</td>
<td>The number of earned core elective credits depends on individual student placement and exemption qualifications.</td>
</tr>
<tr>
<td></td>
<td>Total Minimum Core Credits Earned at NCSSM</td>
<td>27</td>
<td>In addition to earning at least 27 units of core/core elective credit at NCSSM, students must be enrolled for 6 trimesters and earn a final grade of C-/S or higher in all core and core elective classes in which they are enrolled and other required educational activities.</td>
</tr>
<tr>
<td>1</td>
<td>Physical Activity/Wellness</td>
<td>1</td>
<td>One trimester credit required in junior year.</td>
</tr>
<tr>
<td>0</td>
<td>Residential Education</td>
<td>4</td>
<td>Minimum of two trimester credits must be completed in junior year, including RE102 in TRI1.</td>
</tr>
<tr>
<td>0</td>
<td>MiniTerm</td>
<td>2</td>
<td>Final evaluation of &quot;S&quot; in both junior and senior years.</td>
</tr>
<tr>
<td>0</td>
<td>Service Learning</td>
<td>1</td>
<td>Final evaluation of &quot;S&quot; prior to beginning of senior year.</td>
</tr>
<tr>
<td>0</td>
<td>Work Service</td>
<td>1</td>
<td>Final evaluation of &quot;S&quot; in both junior and senior years.</td>
</tr>
</tbody>
</table>

*Students admitted to NCSSM who have not earned the required minimum credits in a subject area are required to complete additional trimester credits in that subject area at NCSSM to meet total graduation requirements.

Final grades in these classes compute into the student's GPA.

Final grades in these classes are reported as letter grades (A,B,C,D) but do not compute into the student's GPA.

Educational activities that are not trimester classes but for which an evaluation of "S" is required for graduation.

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EXEMPTION CRITERIA

Students who demonstrate exceptional mastery of English and United States history, engineering and technology, world languages, chemistry, physics, or biology may qualify to exempt some NCSSM graduation requirements. Guidelines for such exemptions are listed here.

American Studies Exemption Guidelines

Incoming junior students may apply to exempt the American Studies (AS303 or AS305) requirement by submitting an AP score of 4 or 5 on the AP English Literature and Composition Examination AND on the AP U.S. History Examination, and also by completing an NCSSM writing sample in response to an assigned interdisciplinary topic. The writing sample is completed during Orientation in August and is evaluated by Humanities faculty members in light of the NCSSM Rubric for Academic Writing. The Dean of Humanities then reviews the AP scores and the faculty’s evaluation of the student’s writing sample to determine approval for exemption. Students approved to exempt American Studies must complete four units of core English credit and at least two units of core history/social science credit. The interdisciplinary American Studies sequences at NCSSM provide an important common academic experience for the junior class and help to acculturate students to the academic life of NCSSM. For this reason, even students who qualify for exemption are encouraged to take American Studies.

Engineering and Technology Exemption Guidelines

Students may exempt the Engineering and Technology requirement by demonstrating proficiency in one of two ways: submitting an AP score of 4 or 5 on the AP Computer Science A exam AND demonstrated competence in fundamental programming skills or by sitting for an NCSSM Engineering and Technology exemption examination given during Orientation in August. The student may exempt the requirement by scoring above a cutoff established for exemption. Students who exempt the Engineering and Technology requirement are not required to take additional courses in these subject areas at NCSSM.

World Language Exemption Guidelines

Students may exempt the World Language requirement only in languages that are taught at NCSSM: Chinese, French, Japanese, Latin, and Spanish. Incoming junior students who wish to exempt must demonstrate proficiency in one of those languages either through the appropriate NCSSM exemption exam or by submitting an AP score of 4 or 5 in that language.
Students who exempt the World Language requirement are not required to take additional language courses at NCSSM. However, since many colleges and universities require at least two years of formal instruction in a world language, students who have not had such instruction are encouraged to complete that instruction at NCSSM as part of their elective course choices.

**Science Exemption Guidelines**
Students who qualify to exempt one of the NCSSM science discipline requirements must still complete six trimester credits of laboratory science at NCSSM. Students may earn this credit by completing laboratory science courses either in the exempted discipline, or in one of the other science disciplines.

**Biology Exemption Guidelines**
Students with a score of 4 or 5 on the AP Biology examination may exempt the NCSSM biology graduation requirement by submitting a copy of their AP score report. Students with a 4 or 5 on the AP Environmental Science examination may be approved for a modified exemption of the NCSSM biology graduation requirement by submitting a copy of their AP score report. Such students are required to complete one unit of NCSSM biology instead of two.

**Chemistry Exemption Guidelines**
Students with a score of 5 on the AP Chemistry examination may exempt the NCSSM chemistry graduation requirement by submitting a copy of their AP score report.

Students with a score of 4 on the AP Chemistry examination may be approved for a modified exemption of the NCSSM chemistry graduation requirement. Such students are permitted to take chemistry electives to fulfill their NCSSM chemistry graduation requirement by submitting a copy of their AP score report.

Students who have not taken the AP Chemistry examination, but who believe their mastery of the subject may qualify them for exemption may sit for the NCSSM chemistry exemption examination given during Orientation in August. The student may exempt the requirement by scoring above a cutoff established for exemption.

**Physics Exemption Guidelines**
The NCSSM core physics courses are designed to ensure proficiency in the content area of this subject and competence in fundamental physics
laboratory skills. Students may qualify for either partial or full exemption of the NCSSM physics graduation requirement by demonstrating mastery in both of these areas.

There are three ways to demonstrate understanding of the content area:
- AP Physics 1 and AP Physics 2 -- score of 4 or 5 on BOTH of these examinations.
- AP C Physics Mechanics and AP C Physics Electromagnetism – score of 4 or 5 on BOTH of these examinations.
- NO AP Score: Exemption-level score on the NCSSM physics placement/exemption written examination given during Orientation in August.

There are two ways to demonstrate competence in fundamental physics laboratory skills:
- Exemption-level score on the NCSSM physics placement/exemption laboratory practical examination given during Orientation in August.
- Submission of the student’s ORIGINAL laboratory notebook from previous physics course for review and evaluation by the NCSSM Physics Department. This notebook may be sent to the NCSSM Registrar (P.O. Box 2418, Durham, NC 27715-2418). Since we cannot guarantee either the safe arrival or the return of the lab notebook, students are encouraged to first make a scan or photocopy of the notebook for their files before sending the ORIGINAL to the NCSSM Registrar.

Students who qualify for full exemption of the NCSSM physics graduation requirement may substitute any laboratory science course for the two units of physics credit. Students who do not meet criteria for full exemption of the NCSSM physics requirement, but otherwise demonstrate readiness for advanced study in physics, will be evaluated for a customized physics placement or a modified physics exemption, depending upon their test scores and laboratory assessment. Such students may be placed into PH356 Physics with Advanced Topics II and/or the AP Physics C sequence.
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