North Carolina
School of Science
and Mathematics

2018-2019 Course Catalog

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Introduction

The course offerings described in the following pages have been developed for the 2018-2019 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 for details. Students are not permitted to exempt the NCSSM mathematics requirement, the NCSSM Engineering and Computer Science requirement, or the NCSSM American Studies

requirement. Placement in these subject areas, though, takes into account placement assessments based on prior study.

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:

COURSE #	DESCRIPTION	QUALITY POINTS AWARDED BY LETTER GRADE			
		A+ A A-	B+ B B-	C+ C C-	D
300 - 349	Introductory level courses that meet a core NCSSM graduation requirement. Comparable to honors level courses at many high schools	4.50	3.50	2.50	0.00
350 -399	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	4.75	3.75	2.75	0.00
400 -499	Courses at the level of introductory college courses and/or that help prepare students to take an Advanced Placement Examination and courses that deal with topics beyond those of introductory college courses.	5.00	4.00	3.00	0.00
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 **Study Options and Special Programs**). There is also a collection of AP review and preparation materials in the NCSSM Library.

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 tch410hese 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
EN390 Research Experience in the Humanities
HU390 Research Experience in the Fine Arts
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 labor other real world setting 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 wish rigorously to pursue scholarly investigations of their own design. The single-term EN490 Research in the Humanities I course, for which students earn 400-level English credit, is open to those who have completed EN390 Research Experience in the Humanities or the Summer Research Program in the Humanities and who have been approved by the Dean of Humanities. The research is critical and interdisciplinary in nature, resulting in the creation of new knowledge. RHum I students may choose to continue their work, with a focus on preparing their research for competition and publication, in EN492 Research in the Humanities II, for which students earn Core Elective credit. Students in RHum II apply their knowledge and skills in the editing, design, and publication of *Fifth World*, NCSSM's Journal of Research in the Humanities, compete in the annual MIT Inspire National Research Competition, present their research at NCSSM's annual Research Symposium, and may explore other opportunities for publication.

Course:

EN490 Research in the Humanities I
EN492 Research in the Humanities II

Research in Engineering and Computer Science

Research in Engineering and Computer Science is an opportunity for students who want to initiate or continue an in-depth project of their own design. Entry is by application during the first trimester. The two-trimester sequence begins in the winter trimester and during the two trimesters students are guided in the planning, implementation, analysis and presentation of an original research project.

Courses:
EE442 Research in Engineering and Computer Science I
EE444 Research in Engineering and Computer Science 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 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.

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 Siemen's 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 in a Research Symposium, at which students present the results of their research activities through oral and/or poster presentations to the NCSSM community and invited guests.

Summer Research Opportunities

Juniors are encouraged to participate in additional research and other real world opportunities available during the summer break, whether

sponsored by NCSSM or by outside agencies or programs. These experiences not only enrich students' academic experience, but can also open doors for them to participate and compete in competitions such as the Siemens Competition in Math, Science & Technology or the Intel Science Talent Search, as well as gain career experience.

NCSSM-sponsored Summer Research Internship programs offer a variety of opportunities to work on an independent project with NCSSM faculty on campus or with off-campus mentors in the Triangle area. Each summer program student is an active participant on an independent project or an individual part of an ongoing project and presents the work at the NCSSM Summer Research Symposium. Juniors receive application instructions and details for each available position in February. Additional outside research opportunities are made available through individual academic departments and the Counseling Services Office.

Department of Engineering and Computer Science

The Department of Engineering and Computer Science 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 Computer Science 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 Computer Science

Each student must complete at least one unit of core credit in an engineering or computer science course.

Computer Science

CS302 Programming with Engineering Applications
One trimester
Credit: One unit of core engineering/computer science or core elective credit
Meeting Pattern: Four periods per week, including lab or three periods per week including lab and an additional asynchronous online component.

This course uses concepts from engineering and science to inspire students to learn basic programming skills that are widely used in science, technology, engineering, and mathematics (STEM). Students use a spreadsheet and, later, Mathematica to create models of a variety of systems, including dynamic systems, heat loss from buildings, and drinking water systems. Good modeling practice, means of assessing accuracy, and the display of modeling results are important parts of the course. The course includes online and in-class skills building, implementation of classic modeling examples, and a final project in which the student investigates an area of his/her own choosing.

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

This beginning course introduces the basic ideas of computing via the WWW. The focus of this course involves the creation of dynamic web pages. Three layers are built: HTML, for document structure, CSS for document appearance, and JavaScript for page behavior. Students learn how to operate in a command-line interface on a server to host their websites. JavaScript, a full-featured, Turing-complete programming language, is used to learn the fundamental components of programming: variables, objects, functions, conditional logic, and iteration.

CS356 Scientific Programming
One trimester
Credit: One unit core engineering/computer science or core elective credit
Meeting pattern: Four periods per week including lab.

This course teaches computer programming skills and how to apply them for analyzing, interpreting, and displaying both large and small scientific data sets. Using Python, MATLAB, R, Mathmatica, and associated software libraries, students learn to access data sets, write programs to calculate and manipulate data, display data, and perform basic statistical analysis. Programming concepts such as objects, variables, functions, conditional logic, and iterations are important concepts that are taught in the context of scientific programming and which allow this course to serve as a prerequisite for more advanced courses. The course features a final project allowing students to explore datasets in scientific areas of interest to them.

CS358/MA358 Cryptography

One trimester
Credit: One unit core engineering/computer science and core mathematics credit.
Meeting pattern: Four periods per week including lab.

This course introduces students to cryptographic methods used to encipher and decipher secret messages with an emphasis on using computer programming to automate the process. Through class discussions, problem solving, group activities, and programming assignments, students will learn a variety of encryption schemes ranging from the age of Caesar to modern public key encryption used to secure digital communications online. Students will learn introductory number theory and statistics to describe these methods and identify weaknesses that allow secret messages to be read without the key. Students will also master programming topics such as variables, functions, conditional logic, looping and recursion, and file input/output in the Python language to implement each cryptographic method. This course will utilize a blended learning environment with large portions of material being taught online and utilizing in class time for working in groups. Students will receive one unit of credit for this course, but the course will satisfy both the mathematics and engineering/computer science course requirement.

CS422 Databases
One trimester
Credit: One unit core engineering/computer science or core elective credit.
Prerequisite: Prior programming experience. Includes: CS302 Programming with Engineering Applications, CS352 Web Development, CS356 Scientific Programming, EE316 Introductory Robotics, CS358 Cryptography, or adequate score on the computer science placement exam.
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 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), and scalability.

CS424 Procedural Programming
One trimester

Credit: One unit core engineering/computer science or core elective credit.
Prerequisite: CS302 Programming with Engineering Applications, CS352 Web Development, CS356 Scientific Programming, EE316 Introductory Robotics, CS358 Cryptography, or by placement test.
Meeting pattern: Four periods per week including lab.

This intermediate course focuses on building programming skill and gaining exposure to advanced topics such as recursion, object oriented programming, and regular expressions. Students gain experience in writing programs using multiple procedures to solve complex problems. After learning the Python programming language, students work on multiple projects of increasing complexity.

CS426 Java
One trimester
Credit: One unit core engineering/computer science or core elective credit.
Prerequisite: CS424 Procedural Programming, by placement test, or score of 4 or 5 on AP Computer Science A exam.
Meeting pattern: Four periods per week including lab.

This course assumes a firm command of procedure writing and object-based programming. It begins by introducing the basic programming constructs in Java, along with Java's type system. The students learn how to read the JavaAPI documentation and they also learn how to create a simple application programming interface. Student then introduced to object-oriented programming, including such things as inheritance, abstract classes, interfaces, and functional interfaces. These constructs are applied to writing event-driven programs that have a graphical user interface. Several projects of increasing complexity are completed.

CS428 Advanced Java
One trimester
Credit: One unit core engineering/computer science or core elective credit.
Prerequisite: CS426 Java or by placement test.
Meeting pattern: Four periods per week including lab.

This course assumes knowledge of the object-oriented aspects of the Java programming language and of event-driven programming. Data structures and algorithms are applied to create applications that handle and process data. Students learn about creating generic container

classes from scratch, as well as learning about the Java Collections framework and the Streams API.

CS434 C
One trimester
Credit: One unit core engineering/computer science or core elective credit.
Prerequisite: CS424 Procedural Programming, by placement test, or score of 4 or 5 on AP Computer Science A exam.
Meeting pattern: Four periods per week including lab.

This course is a low-level introduction to the C programming language, including pointers, pointer arithmetic, and memory management. Students learn to use valgrind and gdb to debug programs, eliminate segmentation faults, and detect memory leaks. Several projects and case studies incorporating the list model are performed and analyzed using Big-O notation.

CS436 Data Structures
One trimester
Credit: One unit core engineering/computer science or core elective credit.
Prerequisite: CS434 C or by placement test.
Meeting pattern: Four periods per week including lab.

Students use the C programming language to study and implement basic data structures, including trees, expression trees, and search trees and the relevant algorithms and applications. Student choose and implement a case study of a related advanced topic.

CS438 Algorithms
One trimester
Credit: One unit core engineering/computer science or core elective credit.
Prerequisite: CS434 C or by placement test.
Meeting pattern: Four periods per week including lab.

Students use the C programming language to study and implement basic data structures, including heaps, priority queues, and hash tables and the relevant algorithms and applications. Student choose and implement a case study of a related advanced topic.

CS490, CS492, AND CS494 Advanced Computer Science Topics

One trimester each
Credit: One unit each core engineering/computer science or core elective credit.
Prerequisite: Permission of the Dean of Engineering and Computer Science.

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/computer science 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 CAD/CAM
One trimester
Credit: One unit core engineering/computer science 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 17 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/computer science 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/computer science 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/computer science 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/computer science 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/computer science 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.

EE358 Biomedical Engineering
One trimester
Credit: One unit core engineering/computer science 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.

EE362 Engineering the Modern
One trimester
Credit: One unit core engineering/computer science 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.

EE364 Aerospace Engineering
One trimester
Credit: One unit core engineering/computer science or core elective credit.
Meeting Pattern: Four periods per week including lab.

This course introduces students to the field of aerospace engineering, engineering design, and the core math and science concepts needed to solve problems related to aerospace and other engineering disciplines. The course is presented with historical context, emphasizing the development of human flight from antiquity through modern aviation and on into current and future exploration of space.

Topics include spatial reasoning, properties of fluids, descriptions of 3-dimensional motion, the mechanics of flight, and basic aero- and thermodynamic principles applied to the design and control of aircraft and spacecraft. Students have opportunities to experiment, calculate, compute, design and build as they explore and solve problems associated with the mechanics of flight, and are encouraged to earn course credit through aerospace-themed projects of their own design.

EE366 Civil Engineering
One trimester
Credit: One unit core engineering/computer science or core elective credit.
Meeting Pattern: Four periods per week including lab.

This course introduces students to the study and practice of civil engineering. Using activities, design projects, and laboratory modules students learn first-hand how engineers use mathematics and science to solve problems in the context of societal needs and desires, Topics include the engineering design process, engineering math, applied and reactive forces and movements, strength of materials, stresses and

buckling for structures in tension, compression, and bending, common construction materials, hydrostatic loading, and the mechanics and analysis of fluid transport. This course has a 2-week final project where students may explore further course topics of their choosing.

EE368 Environmental Engineering
One trimester
Credit: One unit core engineering/computer science or core elective credit.
Meeting Pattern: Four periods per week including lab.

This course introduces students to the study and practice of environmental engineering. Using activities, design projects, and laboratory modules students learn first-hand how engineers use mathematics and science to solve problems in the context of societal needs and desires. Topics include the engineering design process, engineering math, hydrology and water resources, stormwater modeling and management, drinking and wastewater treatment, surface and groundwater transport, transport of air pollutants, environmental regulation, health effects of environmental pollutants, and mitigation and remediation strategies. This course has a 2-week final project where students may explore further course topics of their choosing.

EE390 Research Experience in Engineering
One trimester
Credit: One unit core engineering/computer science 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/computer science or core elective credit
Prerequisite: Permission of the Dean of Engineering and Computer Science
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/computer science 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 Computer Science
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/computer science 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 Computer Science.
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/computer science or core elective credit.
Prerequisite: MA412 AP Calculus AB (Advanced Topics II) and PH401a Physics with Advanced Topics or PH404 AP Physics C: Mechanics (I), or permission of the Dean of Engineering and Computer Science.
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/computer science 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 Computer Science.
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 as performing artists and 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 course AS303 Writing and American Studies or AS305 American Studies. All students must complete an additional two trimesters of 400-level English credit. Students must also complete study of a world language through the intermediate level or higher at NCSSM, or be exempt.

Art

AR306 Darkroom Photography
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Two periods per week including lab or two 100-minute evening class meetings.

Students get to know the NCSSM darkroom while learning how to use enlargers, mix photographic chemicals, and, by the trimester's end, process and print their own film. After becoming familiar with the basic use, function, and history of a 35mm camera, students create black and white prints on 8" x 10" photography paper. This class utilizes instructor-assisted darkroom work along with independent student work so that students become confident with their abilities to execute, develop, and create photographic prints. Students are expected to maintain a safe and respectful darkroom etiquette, which includes proper handling of chemicals and equipment while developing a healthy studio practice. Although this course is catered to the beginner, all levels of experience are welcome. Intermediate and advanced students will be required to

propose projects, meet deadlines, and share techniques used during formal critiques. Repeatable for credit.

AR316 Digital Photography
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Two periods per week including lab or two 100-minute evening class meetings.

This course introduces students to the concepts and techniques necessary to create, edit, and print color photographic images using digital technology. Units on composition, 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. Students are expected to respect photography equipment, the art studio, and develop a healthy studio practice. Repeatable for credit.

AR318 Open Studio
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Three periods per week or two 100-minute evening class meetings.

Open Studio allows students to develop and transform their own inspirations and conceptions into an artistic reality with the ongoing support of the instructor. Although the students generate their projects, they are challenged to link their concepts to a branch of philosophy, to study artists who have worked with similar concepts or materials, and to close the trimester with a formal critique/presentation about their art and research. The purpose of this course is to gain feedback from the instructor and classmates through one-on-one critiques. Students develop a dialogue about art and learn to articulate their aesthetic values through giving and receiving constructive criticism. This course is perfect for students who have a creative idea and seek the time needed for artistic development. Students work with the instructor to find methods of visually communicating their concepts and have ample studio time to do so. Enrolled students have access to all studio equipment and art materials needed to bring their ideas to life. Repeatable for credit.

AR320 Drawing
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Three periods per week including lab.

Drawing is the foundation of all art studio practices and is highly recommended as a prerequisite for all other art courses. A creative mind is increasingly sought out in every professional career track as art elements and design concepts are interdisciplinary. This course is taught to nurture creative and critical thinking, increase visual communication skills, and reacquaint the student with the "artist within." No experience necessary! All students receive individual feedback from the instructor and further engage with classmates during studio time and the critiquing process. Through traditional drawing exercises with pencil, charcoal, and ink, students gain creative applications to better interpret reality and respond to their aesthetic values. In addition to in-class drawing assignments, all students are given a sketchbook to heighten their observation skills while building a visual vocabulary and further documenting their time at NCSSM. Repeatable for credit.

AR322 Painting
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Three periods per week including lab.

This course is an introduction to basic painting, although all levels of experience are welcome. The primary goal of this course is to develop students' painting skills through constant exploration of visual perception. Assignments address the use of both acrylic and oil paint to create dynamic compositions that incorporate elements such as depth of field, line, texture, linear perspective, and illusion – while students gain knowledge to better understand light and the interaction of color. Students enhance their levels of perception as they learn color theory. No grade can compete with the gift that comes from intuitive color mixing. Through assignments and presentations by the instructor, students gain knowledge, inspiration, and appreciation for art history and from artists working today. All students receive individual feedback from the instructor and further engage with classmates during studio time and the critiquing process. Repeatable for credit.

AR324 Mixed Media: 3D-2D Design
One trimester
Credit: One unit additional elective credit.
Meeting pattern: Two Periods per week including lab.

This art course aims to merge art + technology. Enrolled students will be introduced to our NCSSM FabLab and trained on state-of-the-art fabrication equipment to best bring their creative ideas into existence. The goal of this course is to develop and combine traditional methods of 3D Design with FabLab-inspired approaches and techniques—resulting in

innovative works of art infused with traditional principles and elements of design. Using the resources of NCSSM's FabLab, students will gain hands-on experience creating small sculpture studies. Since drawing is the foundation of all studio art disciplines, students will develop their drawing techniques throughout the term by keeping a sketchbook. The sketchbook will also be used to document progress and creative-thought processes. Through slide presentations and readings, students will gain knowledge and appreciation of art history and become familiar with artists who are working today with innovative methods and materials. Repeatable for credit.

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.

English

Graduation Requirement in English
All junior students must complete the three-trimester, interdisciplinary course AS303 Writing and American Studies or AS305 American Studies. All students must earn two additional units of 400-level English credit.

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).

American Studies is the core humanities experience for all NCSSM juniors. In this interdisciplinary cultural studies course, we explore American history and literature from the fifteenth-century Atlantic World to twenty-first-century digital communities. The year-long course sequence examines the continuing development of both collective and individual American identities through the study of history and historiography, literature and literary theory, politics, economics, the visual arts, film, music, and other aspects of American culture. A key feature of the curriculum is instruction and practice in critical reading, thinking, and writing – skills foundational to NCSSM's senior humanities courses and to future higher-level work across disciplines. Discussions, projects, and written assessments invite students to recover, construct, and interpret the past as narratives woven from many threads. Through collaborative inquiry and investigation, students encounter the past as a means of interrogating issues in our current world and as a path to becoming active citizens in their local and global communities. AS303 is grounded in the same curricular content as AS305 but is designed especially for students who need more intensive practice to develop their skills in critical reading, interpretation, and academic writing. 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.

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.
Meeting pattern: Five periods per week including lab (trimester 1), four periods per week including lab (trimesters 2 and 3).

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EN354 Fiction Writing
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab, or two 100-minute evening class meetings.

This course is designed to serve as a workshop for aspiring fiction writers. 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.

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 or two 100-minute evening class meetings.

"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.

EN390 Research Experience in the Humanities
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab, or two 100-minute evening class meetings.

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 EN490 Research in the Humanities I offers

selected students the opportunity for more substantial work in their chosen fields of scholarship.

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*, Confucius' *Analects*, Laozi's *Dao de Jing*, memorials by Han Feizi and Li Si, the Bible, 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*. Secondary texts and film clips will also be used to interpret these ancient and classical works. 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 and Culture to 1603: *From the Anglo-Saxons to Shakespeare*
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, or two 100-minute evening class meetings.

In this course we examine the Latin Christian, Anglo-Saxon, and Anglo-Norman origins of the Anglo-American literary tradition and the richness of the English Renaissance. We encounter early poems like "The Wanderer" and "The Seafarer," which blend Christian and pagan elements, but which seem strangely modern at times , as well as the story of *Beowulf* – one of the first great epics in the vernacular literature of the Middle Ages. In the fourteenth century, we see the flowering of a uniquely English national literature in narrative poems like *Sir Gawain and the Green Knight*, where 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 spatial dimensions – in the company of a group of pilgrims who are not only on their way to Canterbury, but to their eternal destinations, as well. The end of the course deals with what Stephen Greenblatt has called "Renaissance self-fashioning" – the emerging idea that human beings are, to paraphrase one Italian Renaissance humanist, the "makers and molders of themselves." This bold, new claim to human dignity and freedom is revisited in Elizabethan and early Jacobean plays, with their transgressive heroes – Christopher Marlowe's Dr. Faustus and Shakespeare's Hamlet and Macbeth come to mind. These plays rewrite the concept of heroism amid an expanding economy of imagination and the expanding geography of the Atlantic world in an age of explorations, discoveries, and encounters. Classes include interactive background lectures and are discussion-based. Grades are based on a series of essays that invite students to explore the material from comparative and contextual points of view.

EN404 British Literature and Culture, 1603 – 1837: *From Shakespeare to Frankenstein*
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, or two 100-minute evening class meetings.

This course includes Britain's rise as a modern, maritime, commercial empire, and spans the period from the reign of James I, when England was still a "green and pleasant land," to the accession of Queen Victoria in 1837, when urban blight was everywhere in evidence. We begin with the period of Shakespeare's greatest dramas as the King's playwright in a time of relative peace and plenty, but encounter a very different sensibility in the poetry of the English Civil War. We trace the rise of the

novel – one of the major achievements of English literary history; the democratization of the arts in the Romantic movement that began in the 1790's; and the triumph of the novel as a vehicle for the dissemination of cultural values in Jane Austen's *Pride and Prejudice* and a rejection of Enlightenment rationalism in Mary Shelley's *Frankenstein.* This course also features the last and one of the greatest epics – Milton's *Paradise Lost* – which also features Milton's Satan, a character who recalls Christopher Marlowe's Dr. Faustus, and who inspired both William Blake and Mary Shelley. Classes include interactive background lectures and are discussion-based. Grades are based on a series of essays that invite students to explore the material from comparative and contextual points of view.

EN406 British Literature and Culture since 1837: *From Wuthering Heights to High Modernism and Beyond*
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, or two 100-minute evening class meetings.

This course explores British literature in the Age of Empire – and in the wake of the Empire's decline and dismemberment. Readings include works by Victorian poets, including 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 the self, women, relationships, sexuality, the social world, and the world of Nature. Literary Modernism and the relationship between the visual arts and literature are central features of the course, and readings include works by T.S. Eliot, Virginia Woolf, D.H. Lawrence, and others. We also read Evelyn Waugh's *Brideshead Revisited,* with its 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 post-colonial voices like those of Derek Walcott, whose *Omeros* has become a modern classic. Classes include interactive background lectures and are discussion-based. Grades are based on a series of essays that invite students to explore the material from comparative and contextual points of view.

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.

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 or two 100-minute evening class meetings.

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.

EN414 Modern World Fiction: *Narrating the Self*
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, or two 100-minute evening class meetings.

Beginning with experimental novels of the late nineteenth-century and focusing on French, Spanish, German, Czech, English, American, Cuban, Colombian, African, and Japanese writers, this comparative literature course examines the extraordinary flowering of twentieth-century fiction – with its open-ended form and experimental styles – against a backdrop of what Stephen Kern has called a transformed "culture of time and space." In our effort to understand this rich body of literature, we explore the relationships between movements in philosophy and the visual arts – including photography and film – and the changing shapes of fiction. Readings may include short stories by Jorge Luis Borges and Michel Tournier; novels such as Conrad's *Heart of Darkness,* Bram Stoker's *Dracula*, Osamu Dazai's *No Longer Human*, Milan Kundera's *The Unbearable Lightness of Being*, Faulkner's *The Sound and the Fury*, Alejo Carpentier's *The Kingdom of This World*, Virginia Woolf's *Mrs. Dalloway,* Miguel de Unamuno's *San Manuel Bueno, Mártir*, Kafka's *Metamorphosis*, Gide's *The Immoralist*, Gabriel García Márquez's *One Hundred Years of Solitude*, and Donna Tartt's *Secret History*. Through a series of analytical essays, students explore questions about authors and their audiences and the relationship between literary texts and contexts. In the process, students strengthen their own voices and explore the connections between literary and cultural identity.

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* or Tanizaki's *Naomi*, 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 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.

EN422 Philosophy and Literature in the Twentieth Century: *Strategies for Being*
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: Two 100-minute evening class meetings.

This course explores twentieth-century philosophy, literature, the visual arts, and the thematic ties that bind them together. After 1848, in both texts and images, painters, literary artists, and philosophers increasingly present the self as inherently unstable, reality as a construction, history as a fiction, and the universe as random and chaotic. We read Kierkegaard, who believed that escape from despair lay in taking a "leap" into an "absolute beginning," and Nietzsche, who embraced an ecstatic vision of the self as a product of will and desire. Heidegger, Sartre, Althusser, Baudrillard, and

Deleuze provide other perspectives on the self. In painting, we trace the retreat from the Real in artists like Picasso and Matisse, and the longing to reveal the extraordinary in the ordinary in Magritte – a desire that is pervasive in the novels of Virginia Woolf. Literary texts include Emily Brontë's Wuthering Heights, Paul Bowles's The Sheltering Sky, Marguerite Duras' Hiroshima Mon Amour, Milan Kundera's The Unbearable Lightness of Being, and Samuel Beckett's Company, along with readings in Sartre, Woolf, Dostoevsky, Thomas Mann, Gertrude Stein, and Donna Tartt. Films include Ingmar Bergman's Kierkegaardian Winter Light and Woody Allen's Dostoevskian Crimes and Misdemeanors. Classes are conducted as seminars, with group discussions, background lectures, and presentations. Grades are based on a series of comparative essays and on class participation.

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 del Castillo, and writings by Catalina de Erauso and 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 Juana Manuela Gorriti, Joaquim Maria Machado de Assis, José Martí, Rubén Darío, Ernesto "Che" Guevara, Gabriel GarcÍa Marquez, and Isabel Allende.

EN436 Western European Cultural Studies I: *Classical and Late Antiquity: Greeks, Romans, and the Genesis of the Mediterranean 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: 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: *Medieval and Modern Worlds from St. Augustine to Shakespeare*
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: *Fashioning Selves and Societies in 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. 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 is 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 Civilizations: *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 Civilizations: *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 students' skills in reading, writing, critical thinking, research, and public speaking.

EN446 Western Civilizations: *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.

EN448 Topics in Literature I
2018-2019 Topic: *STEM and the Stage*
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, or two 100-minute evening class meetings.

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. The focus, whenever the course is offered, varies and is announced when course offerings are published.

EN450 Topics in Literature II
2018-2019 Topic: *Writing Lives: Autobiography, History, the Novel, and Film*
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, or two 100-minute evening class meetings.

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. The focus, whenever the course is offered, varies and is announced when course offerings are published.

EN452 Topics in Literature III
2018-2019 Topic: *Modern Latin American Literature in Translation*
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, or two 100-minute evening class meetings.

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. The focus, whenever the course is offered, varies and is announced when course offerings are published.

EN454 Topics in Literature IV
2018-2019 Topic: *Shakespeare Now*
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. The focus, whenever

the course is offered, varies and is announced when course offerings are published.

EN490 Research in the Humanities I
One trimester
Credit: One unit core English credit.
Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies, completion of EN390 Research Experience in the Humanities, and permission of the Dean of Humanities.
Meeting pattern: Three periods per week including lab, or two 100-minute evening classes.

Research in the Humanities I is an opportunity for students who wish rigorously to pursue scholarly investigation of their own design. This single-term course is available to those who have successfully completed EN390 Research Experience in the Humanities or the Summer Research Program in the Humanities and who have been approved by the Dean of Humanities. The research is critical and interdisciplinary in nature, resulting 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 and the MIT Inspire Research Competition. In addition, they may submit their research for publication in *Fifth World*, NCSSM's journal of interdisciplinary research in the humanities, and may explore other opportunities for publication.

EN492 Research in the Humanities II
One trimester
*Credit: One unit core elective credit. *NOT core English Credit.**
Prerequisite: Completion of EN490 Research in the Humanities I and permission of the Dean of Humanities.
Meeting pattern: Three periods per week including lab, or two 100-minute evening classes.

In this course, students who have taken Research in Humanities I transform their researches into scholarly articles for publication in *Fifth World*, NCSSM's journal of interdisciplinary research in the humanities, and for submission to other journals and research competitions such as MIT Inspire. Students also serve as editorial board members of *Fifth World*, reviewing and evaluating submissions, accepting or rejecting submissions, offering suggestions for revisions, completing the layout and design of the journal, and ensuring the timely delivery of the completed journal to the publisher. This experience will include writing abstracts, preparing reports, and creating presentation posters.

History and Social Sciences

Graduation Requirement in History and Social Sciences
All junior students must complete the three-trimester, interdisciplinary course AS303 Writing and American Studies or AS305 American Studies (described under Course Offerings: English).

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 I
2018-2019 Topic: *The Immigrant Experience Today: What is an American?*
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. 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. The focus, whenever the course is offered, varies and is announced when the course offerings are published.

SS362 Topics in History and Social Science II
2018-2019 Topic: *Contemporary Challenges in Economics*
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. 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. The focus, whenever the course is offered, varies and is announced when the course offerings are published.

SS364 Topics in History and Social Science III
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. 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. The focus, whenever the course is offered, varies and is announced when the course offerings are published.

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

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 Civilizations
One trimester
Credit: 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.

SS372 Medical Sociology
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

In this course, students gain an understanding of the social science of medicine – that is, the study of the social causes and consequences of health and illness. We begin with a review of the history of medical care in the United States and the world in general. We then investigate the social

facets of health and disease, the functions of healthcare organizations, the relationship of healthcare delivery systems to other social organizations, the social behavior of healthcare practitioners and consumers, social policies toward health, and the relationship of health services in the United States to other countries.

SS402 AP Microeconomics
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab or two 100-minute 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 100-minute 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 Introduction to Psychology
One trimester
Credit: One unit core elective credit.
Meeting pattern: Four periods per week.

This one-trimester social science elective introduces students to the systematic and scientific study of the behavior and mental processes of human beings. We explore a range of issues, concerns, and specialties in psychology. Initially, we spend a considerable amount of time discussing the psychological perspective and the role of theory and research in psychology. Then we move into an in-depth study of key components of psychology. We learn about some of the explorations and discoveries made by psychologists over the past century and compare, contrast, and assess some of the differing approaches adopted by psychologists, including biological, behavioral, cognitive, humanistic, psychodynamic, and sociocultural perspectives. Most importantly, we come to an understanding and appreciation of how psychologists think and the kind of critical analysis that psychologists espouse and model in their words and actions.

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.

Other Humanities Electives

These humanities elective courses include content that frequently 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.

HU350 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.

HU352 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.

HU354 Black Studies
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab or one period per week including lab and an additional asynchronous online component.

Black Studies implements an interdisciplinary format to examine the cultural, political, and economic development of Black America. The course begins with the African Diaspora and culminates with the rise of Hip Hop culture. On one hand, the course examines a long history of white supremacy in Anglo-American thought and action that exploited black labor and delegitimized black lives. On the other hand, the course interrogates Black America's persistent fight for full citizenship and cultural autonomy – a domestic crusade that draws strength and meaning from anti-colonial struggles abroad. Students will continually ask: What defines whiteness and blackness? What functions do racial classifications serve? Overall, students locate the origins and development of the conflicts and commonalities at the heart of the Black American experience.

HU356 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.

HU358 Race, Leadership, and Ethics
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

Students study profiles of leadership in relationship to issues of racial justice and equality. They acquire an in-depth knowledge of ethics and apply that knowledge to historical and contemporary issues involving racial identity and racial justice in the American cultural landscape. Topics addressed in the course include tools for ethical decision-making, race and education, the criminal justice system and the death penalty, race-based medicine, eugenics, racial profiling, racial privilege, and

appreciation vs. appropriation of culture. Course materials and activities include readings, discussions, films, and guest speakers.

HU362 Topics in Contemporary America
One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of two trimesters of AS303 or AS305.
Meeting pattern: Three periods per week including lab.

This interdisciplinary course allows students to continue their exploration of the multiple strands of American culture begun in the junior year American Studies course. With time for deeper examination of contemporary American life, the course familiarizes students with the context of continuing political, social, and cultural issues and with the arcs of recent change relevant to their own lifetimes. By studying selected primary and secondary sources from the 1960s to the present day, students construct their own understandings of the multiple identities articulated by modern Americans living in increasingly global and virtual communities. The course offers students the opportunity to explore topics of consequence to them, including explorations of the effects of 9/11, the rise of the LGBTQ movement, and the changes wrought on American culture by the internet and mobile computing. Students cultivate skills of analysis that help them to think and speak with greater clarity, power, and eloquence. Assessments include writing assignments that invite students to synthesize their understanding of the texts, contexts, and cultural artifacts explored in the course.

HU364 Women's Studies: Women as Leaders
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

Gloria Steinem famously said, "A feminist is anyone who recognizes the equality and full humanity of women and men." In this course, students explore the role American women have played in shaping our understanding of what it means to be human and in demanding that women's full humanity be recognized – in a culture that, even now, at times derides the Women's Movement or accuses it of being irrelevant. By studying the historical, social, political, economic, and cultural forces that have shaped different waves of feminism and feminist theory/literature, and how they continue to do so today, students learn how to think critically about issues of women's leadership, equality, gender, and history. Through a variety of assignments and activities, students continue to develop their skills in reading, critical thinking, writing, presenting, and working collaboratively with their peers. In a service learning component

of the course, students create a lesson about significant women in American society and teach the lesson to students at a local elementary school.

HU390 Research Experience in the Fine Arts
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

Research informs action; action brings about change. The synthesis, production, and dissemination of new knowledge can have broad implications for every area of human endeavor, and art provides an entryway to new understandings of that human endeavor for both artist and audience. In this course, we explore and apply the research process in the creation of fine art. Through careful study of a selected genre or discipline and rigorous interrogation of a subject or set of subjects, we explore the intersections between fact and invention, the difficulty of separating the objective from the subjective, and the ethical implications of using research to inform the creation of art. The culmination of the course is student-created works of art informed by the research process. The area of the fine arts on which the course focuses varies year to year and encompass the range of the fine arts – from creative writing to the visual arts, music, and drama. The area of the fine arts on which the course focuses may encompass the range of the fine arts – from creative writing to the visual arts, music, and drama and varies from year-to-year. The focus is announced with the published course offerings each year.

Music

Music Instruction, Theory, and Production

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: One period per week with additional asynchronous online component.

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.

MS350, MS352, and MS354 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.

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 MS336 Audio and 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: Two periods per week with additional asynchronous online component.

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 orchestvoice 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.

MU360, MU362, MU364 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.

MU370, MU372, MU374 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.

World Languages

To know a language is to know a culture, and an exciting way to gain insight into the myriad cultures of the world is to learn the language of a culture of interest. We invite NCSSM students to begin the study of a new language or to continue their previous study of Chinese, French, Japanese, Latin, or Spanish.

Incoming juniors may choose to begin study of Chinese, French, Japanese, Latin, or Spanish, and thus will enroll in the Introductory level of that language.

OR

Incoming juniors may choose to continue study of a language in which they have some experience, provided that this language is taught at NCSSM: Chinese, French, Japanese, Latin, and Spanish.

Placement in World Languages

Online Placement Test and Online Intake Form Requirements
If a student has some experience in the one of the five languages we teach at NCSSM (Chinese, French, Japanese, Latin, or Spanish), then the student must take an Online Placement Test or complete an Online Intake Form, which is a request for information from an incoming student about previous study and current knowledge of a language.

- A student choosing French or Spanish must take an online placement test before Welcome Day.
- A student choosing Chinese, Japanese, or Latin must fill out an online intake form before Welcome Day.

Graduation Requirement in World Language

On the basis of the online placement test or online intake form, the World Language instructor determines the level of placement for each student who arrives at NCSSM with some experience in a chosen language.

- A student who begins an Introductory level of a language in the junior year must continue study of that language in the senior year and complete two full years (6 trimesters) of study in that language.
- A student who is placed in the Intermediate level of a language must complete one full year (3 trimesters) of study in that language during the junior year.
- A student who is placed in the Advanced level of a language must complete one full year (3 trimesters) of study in that language during the junior year.

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, and 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, as well as for non-Chinese heritage students who have studied Mandarin as a second language at school. Students are placed in this course if they are able to comfortably carry on extended conversations in Mandarin about everyday topics. The primary focus of the course is on developing students' reading and writing abilities, while continuing to expand their listening and speaking skills. 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 and conducted entirely in Chinese.

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 and to read simple Chinese writings. Students develop and expand their speaking and listening abilities to make formal presentations, to narrate, discuss, debate, and persuade. Students also read authentic materials on a variety of topics related to Chinese culture, history, and modern life. Students improve their composition skills through regular writing assignments. The basics of Classical Chinese are introduced. 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, 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, 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, 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: One unit world language credit.
Meeting pattern: Three periods per week, plus one evening class meeting.

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: Three periods per week, plus one evening class meeting.

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 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 in writing 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.

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.

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 LA410/412/414 sequence and the LA404/406/408 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.

Students 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, 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, 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.

MA358/CS358 Cryptography
One trimester
Credit: One unit core engineering/computer science and core mathematics credit.
Meeting pattern: Four periods per week including lab.

This course introduces students to cryptographic methods used to encipher and decipher secret messages with an emphasis on using computer programming to automate the process. Through class discussions, problem solving, group activities, and programming assignments, students will learn a variety of encryption schemes ranging from the age of Caesar to modern public key encryption used to secure digital communications online. Students will learn introductory number theory and statistics to describe these methods and identify weaknesses that allow secret messages to be read without the key. Students will also master programming topics such as variables, functions, conditional logic, looping and recursion, and file input/output in the Python language to implement each cryptographic method. This course will utilize a blended learning environment with large portions of material being taught online and utilizing in class time for working in groups. Students will receive one unit of credit for this course, but the course will satisfy both the mathematics and engineering/computer science course requirement.

MA360 Investigations in Calculus I
One trimester
Credit: One unit core mathematics or core elective credit.
Prerequisite: Final grade of C or higher in MA305 Precalculus and Modeling or MA355 Precalculus and Modeling with Advanced Topics.
Meeting pattern: Four periods per week including lab.

This course introduces students to concepts of differential calculus and the applications of calculus to mathematical modeling. The emphasis in this course is on understanding many of the big ideas of calculus through discovery labs and the use of technology. 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. There is less of an emphasis on algebraic manipulation in this course compared to other calculus courses. Calculators and computers are frequently used as tools in the course. Topics normally covered include rates of change, linear approximations, interpretations of the derivative, and the concept of a limit.

MA362 Investigations in Calculus II
One trimester
Credit: One unit core mathematics or core elective credit.
Prerequisite: Final grade of C or higher in MA360 Investigations in Calculus I.
Meeting pattern: Four periods per week including lab.

This course continues the study of differential calculus and introduces students to concepts of integral calculus and applications of calculus to mathematical modeling. Emphasis in this course is on understanding many of the big ideas of calculus through discovery labs and the use of technology. 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. There is less of an emphasis on algebraic manipulation in this course compared to other calculus courses. Calculators and computers are frequently used as tools in the course. Topics normally covered include further interpretation and applications of the derivative, differential equations, and numerical integration.

MA364 Investigations in Calculus III
One trimester
Credit: One unit core mathematics or core elective credit.
Prerequisite: Final grade of C or higher in MA362 Investigations in Calculus II.
Meeting pattern: Four periods per week including lab.

This course continues the study of integral calculus and applications of calculus to mathematical modeling. Emphasis in this course is on understanding many of the big ideas of calculus through discovery labs and the use of technology. 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. There is less emphasis on algebraic manipulation in this course compared to other

calculus courses. Calculators and computers are frequently used as tools in the course. Topics normally covered in this trimester include techniques of integration as well as interpretation and applications of the integral.

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'Hopital'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 (1).
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 (II). 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, which requires familiarity with a programming language, 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 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.

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 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 including lab.

This is college-level mathematics course 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 9^{th} or 10^{th} 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.

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. See **Exemptions** at the end of the course catalog for conditions and options for exemption.

The biology course offerings can be divided into four major strands addressing different topical areas (with some courses fitting into more than one strand): Genetics, Human Body, Cellular Biology, and Environmental Biology. BI390 Research Experience in Biology and, for selected students, the Research in Biology sequence (BI442, BI444, BI446, BI448) may also be used to meet the core biology requirement. For students who have previously taken a survey course in biology, these strands can help them select courses within a particular area of interest. For students who have not previously taken a survey course in biology, these strands can guide them to select courses across a range of topics to ensure they are introduced to the broad scope of biology. Although this is not a graduation requirement, the biology faculty encourage students who come to NCSSM without a previous biology course take a full year of biology.

The NCSSM Biology Curriculum addresses five core concepts in Biology. These core concepts are woven throughout course content across all the strands.

- Evolution
- Information Flow, Exchange, and Storage
- Structure and Function
- Pathways and Transformations of Energy and Matter
- Systems

Adapted from:(Vision & Change in Undergraduate Biology: A Call to Action. American Association for the Advancement of Science. 2009. Washington, DC. Available at: http://visionandchange.org/files/2011/03/Revised-Vision-and-Change-Final-Report.pdf)

In addition to addressing these core concepts, many of the biology courses include a significant research component. In these courses, students gain experience with the process of science and develop skills in experimental design, data analysis and interpretation, and/or scientific communication. Biology courses with a significant research component are indicated in the course catalog and in the chart below with the symbol: (*R*).

Some Biology courses rely heavily on mathematics and problem solving. In order to be successful in these courses, students enrolling should have strong mathematical and problem-solving skills. These courses are indicated in the course catalog and in the chart below with the symbol: (*M*).

The chart below shows the Biology courses in each strand with (*R*) and (*M*) designation.

Genetics	**Human Body**	**Cellular Biology**	**Environmental Biology**
BI358 Classical Genetics (*M*)	BI352 Anatomy & Physiology I	BI360 Molecular Genetics (*M*)	BI374 Ecology (*R*)
BI360 Molecular Genetics (*M*)	BI364 Developmental Biology (*R*)	BI406 Neuroscience (*R*)	BI400 Aquatic Ecology (*R*)
BI364 Developmental Biology (*R*)	BI406 Neuroscience (*R*)	BI410 Molecular and Cellular Biology	BI404 Climate Change Biology (*M*)
BI370 Evolution	BI416 Anatomy and Physiology II (*R*)	BI416 Anatomy and Physiology II (*R*)	BI424 AP Environmental Science (I)
BI402 Evolution with Advanced Topics (*M*)	BI422 Immunology	BI422 Immunology	BI426 AP Environmental Science (II)
BI434 AP Biology (I) (*R*)	BI438 AP Biology (III) (*R*)	BI434 AP Biology (I) (*R*)	BI438 AP Biology (III) (*R*)
BI436 AP Biology (II) (*R*)			

Non-Stranded Courses
BI390 Research Experience in Biology (*R*)
BI442 Research in Biology I (*R*)
BI444 Research in Biology II (*R*)
BI446 Research in Biology III (*R*)

BI448 Research in Biology IV

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.

BI356 Sports Kinesiology I
One trimester
Credit: One unit core biology or core elective credit.
Meeting pattern: Four periods per week including lab.

This course provides an in-depth study of the skeleton and muscular structure and function of the lower extremity of the human body. Topics include origins, insertions, action and nerve innervation of muscles in the body, along with in-depth study of the skeletal lower extremity, some discussion of the central nervous system and of the cardiovascular system. The laboratory component of this course takes place in the gym and weight room where students study their own bodies to learn about the function and action of the muscles, with hands on palpation of other students.

BI358 Classical Genetics (*M*)
One trimester
Credit: One unit core biology or core elective credit.
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. Students enrolling in this course should have strong mathematical and problem-solving skills.

BI360 Molecular Genetics (*M*)
One trimester
Credit: One unit core biology or core elective credit.
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. Students enrolling in this course should have strong mathematical and problem-solving skills.

BI364 Developmental Biology (*R*)
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. This course includes a significant research component.

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 (*R*)
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. This course includes a significant research component.

BI390 Research Experience in Biology (*R*)
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. This course includes a significant research component.

BI400 Aquatic Ecology (*R*)
One trimester
Credit: One unit core biology or core elective credit.
Prerequisite: Completion of BI374 Ecology.
Meeting pattern: Four periods per week including lab, plus 1 required Saturday trip to the beach.

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. This course includes a significant research component.

BI402 Evolution with Advanced Topics (*M*)
One trimester
Credit: One unit core biology or core elective credit.
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. Students enrolling in this course should have strong mathematical and problem-solving skills.

NOTE: Students may take either this course or BI370 Evolution, but not both.

BI404 Climate Change Biology (*M*)
One trimester
Credit: One unit core biology or elective credit.
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. Students enrolling in this course should have strong mathematical and problem-solving skills.

BI406 Neuroscience (*R*)
One trimester
Credit: One unit core biology or elective credit.
Prerequisite: Completion, with a course grade of B- or higher in at least one course from either the Human Body or Cellular Biology course strands (BI352, BI360, BI364, BI410, BI416, BI422, BI434, BI436, BI438).

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 sensory input, motor control, animals as model organisms for human behavior, auditory and visual perception, higher order processing, and memory. The course will provide an entry into how scientists attempt to understand the complexity of our human experience as sentient biological entities. This course emphasizes group work through a significant amount of independent project work. This course includes a significant research component.

BI408 Sports Kinesiology II
One trimester
Credit: One unit core biology or core elective credit.
Prerequisite: Completion of BI356 Sports Kinesiology or permission of the Dean of Science
Meeting pattern: Four periods per week including lab.

This course continues the study of the skeleton and muscular structure and function of the lower extremity human body begun in BI356 Sports Kinesiology I. Topics include origins, insertions, action and nerve innervation of muscles in the body, along with in depth study of the skeletal upper extremity, some discussion of cranial nerves, spinal column, pelvic cavity and urinary systems.The gym-based laboratory component of this course puts special emphasis on the function and action of these muscles, with hands on palpation of other students. Parental permission is required for a field trip to a human cadaver lab.

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 (*R*)
One trimester

Credit: One unit core biology or core elective credit.
Prerequisite: BI352 Anatomy and Physiology I, or BI356 Sports Kinesiology I, or BI364 Developmental Biology, 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.

Building upon the concepts learned in BI352 Anatomy and Physiology I, and emphasizing experimental design and scientific writing, this course provides an in-depth study of the processes needed to maintain human health. Major themes include homeostasis, the disease-state, and the major organ systems discussed in BI352 Anatomy and Physiology I, with particular emphasis on nervous and endocrine control mechanisms. The laboratory component of the course explores physiological concepts via experimentation. This course includes a significant research component.

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.

BI434 AP Biology (I) (*R*)
BI436 AP Biology (II) (*R*)
BI438 AP Biology (III) (*R*)
One trimester each
Credit: One unit each core biology or core elective credit.
Prerequisite: For BI434, 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 in 9th or 10th grade with a grade of A or higher and permission of the Dean of Science may also qualify. Then, each course in sequence, or permission of the Dean of Science, is prerequisite for the next course.
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. Each of these courses includes a significant research component.

BI442 Research in Biology I (*R*)
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. This course includes a significant research component.

BI444 Research in Biology II (*R*)
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. This course includes a significant research component.

BI446 Research in Biology III (*R*)
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. This course includes a significant research component.

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.

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 the Exemptions section at the end of this document 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 CH401or 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).

CH352 Chemistry II
One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of CH307 with a grade of B- or higher or permission of the Dean of Science.
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. Mass spectroscopy, free energy, organic chemistry, and other advanced topics are included. Students are 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 of CH307 and are interested in advanced topics, or who are considering taking a chemistry subject standardized exam such at the SAT subject test or AP exam should enroll.

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, whenever the course is offered, varies and is announced when 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: Completion of any NCSSM general chemistry course with a grade of B or higher 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 final grade of B or higher in CH410 Organic Chemistry, or exemption from the NCSSM core chemistry requirement and permission of the Dean of Science. Completion of an NCSSM biology course is recommended but not required.
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, students learn important biochemical techniques required to purify a protein and to analyze enzyme kinetics and protein-ligand interactions.

CH420 Introduction to Applied Chemistry and Engineering
One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of any NCSSM general chemistry course with a grade of B or higher or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.
Meeting pattern: Five periods per week including lab.

This course provides a comprehensive and multi-disciplinary overview of the global chemical industry, covering the chemical synthesis of major inorganic and organic products, chemical engineering concepts, and history and economics of the chemical industry. Four-member student teams conduct a trimester-long product development lab designed to meet product requirements determined via consumer market analysis. Students gain a broad understanding of the international chemical industry and of chemical engineering, acquire practical, real world experience with the product development process, and develop problem-solving skills within a teamwork model.

CH422 Polymer Chemistry
One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of any NCSSM general chemistry course with a grade of B or higher 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.

CH428 Materials 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 explores the connection between material properties and the underlying chemical phenomena on which those properties depend. We examine the structure-function relationships that give rise to properties such as conductivity, elasticity, optical response, and material strength. In both the classroom and the laboratory, we explore polymers, inorganic semiconductors, ceramics and glasses, organic electronics (photovoltaics, batteries, LEDs), and more. We also consider special topics in surface chemical phenomena, responsive materials, and nanomaterials.

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.

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, PH401 Physics with Advanced Topics, or PH404 AP Physics C: Mechanics (I)/PH406 AP Physics C: Mechanics (II)/Electricity and Magnetism (I). See the Exemptions section at the end of this document 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 PH402 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 PH401 Physics with Advanced Topics. PH307 Physics and PH401 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 binocular and nighttime sky observations are available. NOTE: Due to overlap of some content and mastery beyond the scope of this course, this is not an appropriate course for students who have completed PH418 Astrophysics.

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.

PH352 Waves, Sound, and Optics
One trimester
Credit: One unit core elective credit.
Prerequisite: Honors-level high school physics course.
Meeting pattern: Five periods per week including lab.

This course investigates the physics and application of waves, with emphasis on sound and light waves. We will study how waves are produced, travel, and interact with materials, how sound waves are used to create music, and how light waves are used in technologies including microscopes, spectrometers, interferometers, and lasers. Topics covered include wave properties; wave behaviors including reflection, refraction, interferences, and diffraction; physics of music; geometric optics; and physics of color. The course has a strong lab component, and students will have the opportunity to complete several short projects.

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. No previous physics coursework is required. 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.

PH401a/PH401b Physics with Advanced Topics

Two trimesters
Credit: Two units core physics credit.
Corequisite: MA355 Precalculus and Modeling with Advanced Topics.
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 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.

PH402 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 Sciences.
Corequisite: MA355 Precalculus and Modeling with Advanced Topics.
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 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.

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 PH401 Physics with Advanced Topics or PH402 Physics with Advanced Topics II, 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 that course. 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 electric forces and fields, Gauss' law, capacitance, and voltage. 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 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 (II) 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 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 PH401 Physics with Advanced Topics or PH402 Physics with Advanced Topics II, 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 survey of physics developed since the start of the twentieth century. Topics are selected from special and general relativity, atomic and nuclear structure, radioactivity and nuclear reactions and elementary particles. Students may have the opportunity to participate in a weekend particle physics master class at Duke University.

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.

PH414 Advanced Physics Problem Solving
One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of PH401 with a final grade of B+ or higher, or completion of PH404 and PH406 with a grade of B+ or higher, or exemption of NCSSM Physics, or permission of the Dean of Science.
Meeting pattern: Three periods per week.

The course is for students who want to expand the range of physics problems they are able to solve. Students will solve problems in the areas of physics covered on the AP Physics 1 and AP Physics 2 syllabi, with emphasis on topics not covered in NCSSM's core physics courses. Students will be expected to learn content from independent textbook readings and come to class prepared to discuss the material and apply it to solve problems. Topics covered may include rotational mechanics, fluids, thermodynamics, wave motion, electromagnetism, optics, and other areas. Students will work in groups to solve problems in class and present their solutions, and will work additional problems for homework. Calculus is not required for problems addressed in this course. This course may be used to help students prepare to take the AP Physics 1 or AP Physics 2 exams, or to prepare for the International Physics Olympiad competition. Note - this course does not satisfy the lab science graduation requirement.

PH416 Quantum Mechanics
One trimester
Credit: One unit core elective credit.
Prerequisite: Completion of PH406 or PH401 with a B+ or higher, or PH307 with an A- or higher and any high school calculus course, or exemption of NCSSM Physics, or permission of Dean of Science.
Meeting pattern: Five periods per week including lab.

This course provides an introduction to the quantum mechanical world where objects can behave as both waves and particles. It complements PH410 Modern Physics and goes into much more detail regarding the need for and development of quantum mechanics at the beginning of the previous century. The course covers concepts and applications of the

Schrodinger equation to phenomena such as spectroscopy and radioactivity.

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 PH401 Physics with Advanced Topics or PH402 Physics with Advanced Topics II, 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.

This course uses ideas from physics (such as the properties of light, Newtonian gravity, and special and general relativity) to investigate topics such as the solar system, stars, and cosmology. Mathematical and numerical modeling is emphasized throughout the course as an important tool for astrophysicists. Students will have the opportunity to complete a project on a topic that they find particularly interesting.
NOTE: Students who come to this course from PH307 will find it necessary to study some additional topics not taught in that course.

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 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 physics 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 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.

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.

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.

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.

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.

Other Science Electives

These science elective courses include content that frequently 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.

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.

Mentorship and Other Interdisciplinary Elective Courses

These core elective courses include content that frequently 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.

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.

IE360 Digital Humanities
One trimester
Credit: One unit core elective credit.
Meeting pattern: Three periods per week including lab.

This course lies at the intersection of the study of the humanities – literature and language, history, economics, psychology, sociology, and the arts – with the technologies, techniques, and tools of computational science. Digital Humanities is one of the most rapidly expanding disciplines in humanities research, and students taking this course will be at that cutting edge. Students learn and apply a wide variety of computing methods such as text pattern analyses, network generation and analyses, and image processing and tools such as Mathematica and R to the study of

literature, history, art, and other topics in the humanities and the social sciences. By situating our experiences with technology within their historical contexts, we develop an understanding of the ever-changing role of technology in our lives and an understanding how technology affects the ways we think and experience the world. Texts include The Bestseller Code: Anatomy of the Blockbuster Novel, excerpts from The Shallows: What the Internet is Doing to Our Brains, and selections by Noam Chomsky, Neil Postman, Leo Marx, and Lewis Mumford. A main feature of the course is the emphasis on practical applications of digital humanities techniques: students complete at least three mini-projects with a culminating final project. Digital Humanities will be team-taught by faculty from both the Humanities Department and the Science Department. No prior programming experience is required.

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.

IE450 Applications in Entrepreneurship
One trimester
Credit: One unit core elective credit.
Prerequisite: Selection by the proposal evaluation committee.
Meeting pattern: One 100-minute 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.

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.

CH412 Introduction to Computational Chemistry
One Semester
Credit: One unit core engineering/computer science 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:
https://www.ncssm.edu/online-program/academics/courses?subject=all&q=

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.

Couse description, detailed pre-requisites, and other information:
https://www.ncssm.edu/online-program/academics/courses?subject=all&q=

CS308 Scientific Programming
One Semester
Credit: One unit core engineering/computer science 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:
https://www.ncssm.edu/online-program/academics/courses?subject=all&q=

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:
https://www.ncssm.edu/online-program/academics/courses?subject=all&q=

IE380 Bioinformatics – Computational Biology
One Semester
Credit: One unit core engineering/computer science 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:
https://www.ncssm.edu/online-program/academics/courses?subject=all&q=

IE404 Earth Processes and Materials: Systems/Analysis
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: https://www.ncssm.edu/online-program/academics/courses?subject=all&q=

IE408 Energy and Sustainability
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: https://www.ncssm.edu/online-program/academics/courses?subject=all&q=

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: https://www.ncssm.edu/online-program/academics/courses?subject=all&q=

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: https://www.ncssm.edu/online-program/academics/courses?subject=all&q=

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:

FALL VARSITY SPORTS	**WINTER VARSITY SPORTS**	**SPRING VARSITY SPORTS**
VS102 Men's Soccer	VS122 Men's Basketball	VS142 Men's Golf
VS104 Women's Volleyball	VS124 Women's Basketball	VS144 Men's Tennis
VS106 Women's Tennis	VS126 Swimming	VS146 Men's Baseball
VS108 Cross-Country	VS128 Men's Wrestling	VS148 Women's Softball
VS110 Competitive Cheer	VS130 Cheerleading	VS150 Women's Soccer
VS112 Women's Golf	VS132 Indoor Track	VS152 Track and Field
	VS134 Diving	

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.

These courses 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
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.

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.

PA166 TRX Suspension Training
One trimester
Credit: One unit physical activity or additional elective credit.
Meeting pattern: One period per week including lab.

This course is for students interested in learning the proper techniques and benefits of TRX suspension training. This unique form of exercise uses your body weight to simultaneously develop strength, balance, flexibility, and core stability. The TRX equipment leverages gravity and the user's body weight to complete hundreds of cardio and strength training exercise. 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.

PA168 POP Pilates
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 who want a high intensity, total body, equipment free workout that sculpts a rock solid core and a lean dancer's body. POP Pilates combined the fundamentals of traditional pilates with pop music which makes it feel like a dance on the mat.

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.

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 advanced 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.

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 **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 Cornerstone: Foundational Life Skills
One Trimester
Credit: One unit residential education credit.
Meeting pattern: One period per week.

Using a holistic educational approach, this cornerstone course helps students integrate into the life and culture of NCSSM and to establish the foundation necessary for success in the classroom, in relationships, and in community living at NCSSM and beyond. This class is a basis for future academic, personal, and professional success. Topics include time management, conflict management and healthy relationships, stress management, and resume-writing.

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
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.

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.

Excellence in Leadership is designed to help students learn and develop leadership skills that can be utilized at NCSSM, in their future college environment, and in the outside world. Through group interaction and personal reflection students will begin to identify and understand their strengths and personal leadership style, how one's history and experience

impact leadership, and how to effectively develop teams and communities. The course takes a hands-on approach to learning leadership theory, and focuses specifically on the relational leadership model as the lens by which to examine effective leadership.

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

Financial Planning is designed to provide students financial literacy and develop the skills necessary to effectively manage their current and future financial resources. Topics include budgeting, consumer economics, college finance, loans, employment, insurance, taxes, and investing. The course focuses on practical applications of the material throughout the student's life. Through RE120 Financial Planning students are also provided a foundational understanding of economic policy and principles, access to additional content and resources not covered in the course, and current events that impact the financial aspects of their lives.

RE122 NCSSM to College
One Trimester
Credit: One unit residential education credit.
Prerequisite: RE102 Residential Education.
Meeting pattern: One period per week.

The course, co-taught as a collaboration between Residential Education and Counseling, is designed to allow students to successfully transition from NCSSM to their future college or university environment. Designed to be taken in the third trimester of a student's junior year, NCSSM to College prepares students through focusing on the college selection process, the college application process, financial aid, and college selection. By the end of the course students will have a list of colleges to which they intend to apply, a completed draft of their Common Application and its essay, a timeline for their personal college application process including scholarship and aid deadlines, and a connection to resources that can help them continue their college decision process after the course has finished.

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 tracking hours through LetServe, providing daily reflections on their service through the software. In the fall, students will share with other members of the NCSSM community in a small group reflection session based on their experiences.

SL105a/SL105b/SL105c Campus 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

Minimum credits from 9th/10th grade*	Subject Area	Minimum Trimester Credits to be earned at NCSSM	NOTES
0	Engineering/ Computer Science	1	
2	English	5	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.
1	History/ Social Science	3	These credits are earned in the required AS303 or AS305.
2	Mathematics	5	These credits must include completion of MA305 or MA355, or higher, at NCSSM.
1	Science	6	Two trimester credits each in biology, chemistry, and physics, regardless of prior study.
0	World Language	3 or 6	Three trimester credits are required in junior year and total credits earned must include the Intermediate Level or higher at NCSSM.
1	Core Electives	Varies	The number of earned core elective credits depends on individual student placement and exemption qualifications.
	Total Minimum Core Credits Earned at NCSSM	**27**	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.
1	Physical Activity/ Wellness	1	One trimester credit required in junior year.
0	Residential Education	4	Minimum of two trimester credits must be completed in junior year, including RE102 in TRI1.
0	MiniTerm	2	Final evaluation of "S" in both junior and senior years.
0	Service Learning	1	Final evaluation of "S" prior to beginning of senior year.
0	Work Service	1	Final evaluation of "S" in both junior and senior years.

*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.

Exemption Criteria

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

World Language Exemption Guidelines

Incoming juniors who come to NCSSM with a very high level of proficiency in one of the five languages we teach (Chinese, French, Japanese, Latin, and Spanish) may attempt to qualify for exemption of the NCSSM graduation requirement in World Languages.

Incoming juniors may exempt the World Language graduation requirement only in languages that we teach at NCSSM: Chinese, French, Japanese, Latin, and Spanish.

Incoming juniors may achieve exemption in World Languages by one of two ways:

1. By demonstrating high proficiency in the language by means of the NCSSM Exemption Exam in the chosen language. Exemption Exams are administered in August during Orientation. Exemption Exams should not be confused with the online language placement tests that incoming juniors take in the spring. The Exemption Exams and online placement tests are distinct and separate assessments.
2. By demonstrating high proficiency of the language by means of a score of 4 or 5 on the AP Exam in Chinese, French, Japanese, Latin, or Spanish. Incoming juniors who have achieved such a score should submit an official report to NCSSM's Registrar as soon as soon as it is available.

Students who have fulfilled the World Language graduation requirement and wish to pursue further language study for Core elective credit have two options:

- to begin a new language offered at NCSSM and complete at least one year of study;
- to continue study at a higher level in the language whose requirement has been fulfilled or which has been studied previously, provided that the language is offered at NCSSM.

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 and must substitute additional laboratory science credit either in biology or in one of the other science disciplines for the other unit of required biology credit.

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 who submit an AP Chemistry examination score report of 4 may be approved for a modified exemption of the NCSSM chemistry graduation requirement. Such students are required to complete one unit of NCSSM lab-based chemistry core elective credit instead of two and must substitute additional laboratory science credit either in chemistry or in one of the other science disciplines for the other unit of required chemistry credit.

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 must substitute any laboratory science course in physics or in one of the other science disciplines for the two units of core 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 PH402 Physics with Advanced Topics II and/or the AP Physics C sequence. Students who place into PH402 must substitute additional laboratory science credit either in physics or in one of the other science disciplines for the other unit of required core physics credit.

Special Topics Courses, 2018-2019

EN448 Topics in Literature I (Trimester 1)
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.

EN448 (T1) Topic: STEM and the Stage
If "it's the wanting to know that makes us matter," as Tom Stoppard suggests in *Arcadia*, then it's little wonder that the endeavors of STEM fields to understand the mysteries of our universe have proven such fertile ground for dramatists. In this page-to-stage course, we examine how theatrical art wrestles with the implications and repercussions of STEM discoveries to explore larger questions of our humanity, purpose, and meaning. In addition to plays that include *Life of Galileo*, *Copenhagen,* and *Arcadia,* we consider a range of historical, literary, and scholarly texts that inform and contextualize these works. Through close reading, we strengthen our communication skills by analyzing and critiquing the way an author orients a lay audience to complex STEM concepts and connects them to larger thematic ideas. In a broader sense, our chief concern is to investigate how the efforts of science, mathematics, and the humanities to explain our world intersect, inform, and challenge one another—how in mapping the stars, we might also map our hearts and minds. Creative, stage-related projects and formal academic writing assignments provide substantial opportunities for students to experiment with their own ideas and demonstrate their learning throughout the course.

EN450 Topics in Literature II (Trimester I)
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: Two 100-minute evening class meetings.

EN450 (T1) Topic: Writing Lives: Autobiography, History, the Novel, and Film
This course examines the intersection of real and imaginary pasts in history, autobiography, film, and the novel. Its starting point is Nietzsche's claim that "Every name in history is 'I,' and it includes meditations on the essentially fictional nature of history in Simon Schama's *Dead Certainties*, and Alexis de Tocqueville's *Democracy in America*, with its timeless analysis of American identity. Our reading traces the origins of life-writing and the path from Renaissance self-fashioning to the extinction of the self in the postmodern world. Some works, such as Ernest Hemingway's *A Moveable Feast* and Sylvia Plath's semi-autobiographical *The Bell Jar*, remain controversial because their versions of personal history conflict with the historical record, the recollections of others, or both. Other texts may include Henry Adams's *The Education of Henry Adams*—written in the third person; Vladimir Nabokov's *Speak, Memory*— written in English, rather than Nabokov's native Russian; Samuel Beckett's *Company*, where the autobiographical "I" is reduced to a second-person "you"; Gertrude Stein's *The Autobiography of Alice B. Toklas*, a biography of another

person; and Charlotte Brontë's novel *Jane Eyre*, a novel of self- affirmation that is also filled with autobiographical fragments. Historical novels may include E.L. Doctorow's recreation of the lives of the children of Julius and Ethel Rosenberg in *The Book of Daniel*. Background readings include an examination and development of changing versions of the idea of the individual, from St. Augustine to Rousseau, as well as contextualizing selections from Montaigne, Kierkegaard, Nietzsche, Freud, and other writers. Films may include Luca Guadagnino's *Call Me by Your Name*, Maggie Betts' *The Novitiate*, Greta Gerwig's *Lady Bird*, and Pablo Larraín's *Jackie*. Classes are discussion-based, with interactive background lectures on philosophy, history, and the visual arts. Grades are based on discussions and on a series of essays.

EN452 Topics in Literature III (Trimester 2)
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.

EN452 (T2) Topic: Modern Latin American Literature in Translation
This survey course explores Latin American fiction in the 20th and 21st centuries, with excursions into memoir, essay, and poetry. Writers of the Latin American "Boom" of the 1960s and 70s such as Gabriel Garcia Marquez and Julio Cortazar will be studied alongside authors such as Uruguayan short story writer Horacio Quiroga, Cuban novelist Alejo Carpentier, Argentinian purveyor of enigmatic fictions Jorge Luis Borges, and protean Brazilian writer Clarice Lispector, whose short fiction and novels are at the moment finding a large audience in North America. In Latin America, literature and politics are hardly strangers; we will particularly examine the influence and representations of two political events – the Cuban Revolution of the late 1950s and the Chilean coup d'etat in 1973, the latter of which was experienced firsthand by Ariel Dorfman and Roberto Bolaño, writers whose accounts of the event we will compare. Students will read, research, and write about contemporary authors such as Valeria Luiselli and César Aira, and we will debate the usefulness of terms associated with Modern Latin American literature (e.g. "magical realism"). Hovering over the course are the questions of who gets translated and why. Examining these questions will give students the opportunity to reflect on the global marketplace's relationship to literature.

EN454 Topics in Literature IV (Trimester 3)

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.

EN454 (T3) T3 Topic: Shakespeare Now
Few playwrights' body of work persists in production as dependably as that of William Shakespeare, the Elizabethan bard who, as his contemporary Ben Jonson eulogized, "was not of an age, but for all time." Yet today these plays are as likely to elude as illuminate—at times accomplishing both in the same breath. We'll turn many a page and roll film as we seek to more deeply understand these texts not only in their historical contexts but in light of modern adaptation and staging concerns for film and theater. Class discussion and substantial writing opportunities seek to bridge close analytical readings and broader contextual understandings of these plays in period, at present, and points between. Creative projects and presentations offer students the chance to learn in process and "suffer the slings and arrows" of rendering these works to engage an audience. As we hold the proverbial "mirror up to nature," what will these plays say to us now, and perhaps more importantly, what will that say about who we are?

SS360 Topics in History and Social Science I (T3)
One trimester Credit: One unit core elective credit.
Meeting Pattern: Three periods per week including lab.

SS360 (T3) Topic: The Immigrant Experience Today: What is an American?
The experiences of immigrants to this "nation of immigrants" have a profound influence on our nation's history and a deep influence on the development of what it means to be an American. Immigration patterns and policy play key roles in these experiences. However, the United States has a fraught relationship with its own immigration history and remains divided about immigration policy. In this course, we examine 20th- and 21st-century public policy and how political decisions affect and reflect the realities faced by immigrants, particularly immigrants from Asia, Africa, and Central and South America. In addition, by reading fiction by authors including Chimamanda Adichie, Junot Diaz, Fae Myenne Ng, and Jhumpa Lahiri, we examine how stories tell personal as well as political truths about the immigrant experience. By collecting oral histories from friends, family, and community members, students will contribute to current scholarship on immigration and will create work that can be contributed to the University of Minnesota immigration archives.

SS362 Topics in History and Social Science II (T3)

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

SS362 (T3) Topic: Contemporary Challenges in Economics
Prerequisite: Completion of SS402 AP Macroeconomics and/or SS404 AP Microeconomics

This course affords students an opportunity to conduct an extended investigation into Advanced Placement Economics concepts and principles. The course is designed to explore these concepts and principles as applied in the contemporary global economic framework. Project-based and student-driven, the course provides students with a platform to research modern real world challenges and design innovative solutions. Some contemporary challenges that may be addressed include artificial intelligence, income inequality, globalization, sustainability, and climate change. Importantly, the specific challenges selected will be student initiated. The course will proceed with an intentional interdisciplinary focus, as the challenges to be addressed transcend any one area of knowledge. Moreover, a portion of the course will be dedicated to providing a substantive and thorough preparation for examinations in both AP Macroeconomics and Microeconomics.