



# NCSSM COURSE CATALOG 2012-2013



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## INTRODUCTION

The course offerings described in the following pages have been developed for the 2012-2013 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, Student Life 101/201, 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 pages 116-119 *Graduation Requirements and Exemption Criteria* of this catalog for details. Students are not permitted to exempt the NCSSM mathematics requirement.

Grade reports are issued to students and parents at the end of each trimester. The following letter evaluation system is used and interpreted on school documents:

- 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 number of hours as in the day schedule. Other exceptions are approved by the Vice Chancellor for Academic Programs.



## QUALITY POINTS AND GPA

The 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	5.0	4.0	3.0	0.0
350 – 399	Meet one or more of the following criteria: <ul style="list-style-type: none"> <li>• accelerated versions of classes at the 300 – 349 level</li> <li>• courses that require prerequisites taken at NCSSM</li> <li>• courses at a level higher than a typical high school honors course</li> <li>• courses that are for seniors only</li> </ul>	5.5	4.5	3.5	0.0
400 – 449	Courses at the level of introductory college courses and/or that help prepare students to take an Advanced Placement examination	6.0	5.0	4.0	0.0
450 – 499	Courses that deal with topics beyond those of introductory college courses	6.0	5.0	4.0	0.0

All NCSSM courses are at the honors level or higher. Physical Activity/Wellness courses, Student Life courses, Work Service, Summer 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*, page PP). There is also a collection of AP review and preparation materials in the NCSSM Library.

In recent years, approximately 82% of each graduating class has taken one or more AP examinations. Of NCSSM students sitting for the examinations, approximately 72% scored a 4 or 5 (this compares with approximately 34% of all AP test-takers). Another 19% of NCSSM students sitting for AP examinations scored a 3 (see the NCSSM Profile).

**SPECIAL NOTICE**

*This catalog lists all of those courses that the School is prepared to offer. Since the total enrollment of the School is relatively small, it may not be possible or desirable to offer all courses every year. If faculty resources are not available, or if the enrollment for a given course does not meet the minimum instructional number of students, the course may not be offered. In planning their instructional programs, students should be prepared to elect alternative courses if their first choice is not available.*

## **RESEARCH AT NCSSM**

Recognizing the importance of technical and problem-solving skills and the increasing demand for research learning opportunities among our students, NCSSM offers a variety of research options for both juniors and seniors. Whether highly specialized research leading to involvement in national competition or exposure at a more basic level to the academic research process, the goal is to meet our students where they are in terms of previous experience and potential interest and to equip them to take full advantage of the growing number of research programs available to undergraduates at the university level.

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

### **Research Experience**

For students with little previous experience, Research Experience courses provide research skills development and the opportunity to complete a comprehensive research project in science, humanities, or computer science.

Research experience courses in humanities and computer science begin in the spring trimester of the junior year with an introductory course laying the groundwork for developing an appropriate project. That is followed by a completion course in the fall or winter trimester of the senior year where the project is implemented and findings presented.

*Junior year course options:*

IE354 Introduction to the Research Experience—Computer Science

IE354 Introduction to the Research Experience—Humanities

*Senior year courses (required after completing IE354 in junior year):*

IE364 Completion of the Research Experience—Computer Science

IE364 Completion of the Research Experience—Humanities

Research experience courses in science are single-term courses, available to juniors or seniors. Course options are:

IE370 Research Experience in Biology

IE372 Research Experience in Environmental Science

IE374 Research Experience in Applied Chemistry and Engineering

IE376 Research Experience in Mathematical Chemistry

IE378 Research Experience in Physics

## **Mentorship**

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

### *Courses:*

IE308 Explorations in Mentorship

IE405 Mentorship—Senior Research

## **Research in 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 Computational Science**

Computational science is a new research methodology that uses mathematical models and simulations to study complex scientific problems.



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

*Courses:*

IE442 Research in Computational Science I

IE444 Research in Computational Science II

IE446 Research in Computational Science III

IE448 Research in Computational Science IV

### **Research in Mathematics**

Students earn a research credential in Mathematics by successfully completing an upper level course in Mathematical Modeling or a two-trimester sequence researching an unsolved mathematical problem, typically in the fields of graph theory and complex systems. These options are project oriented, with students designing experiments to mathematically analyze real world problems, gathering and testing data then presenting their results. Entry is by permission of the Dean of Mathematics. Students with a strong background in mathematics may be approved to begin the research sequence in the junior year, while Mathematical Modeling is open only to seniors.

*Courses:*

MA470 Mathematical Modeling

MA472 Research in Mathematics I

MA474 Research in Mathematics II

### **NCSSM Research Symposium**

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

### **Summer Research Opportunities**

Juniors are encouraged to participate in additional research opportunities available during the summer break, whether sponsored by NCSSM or by outside agencies or programs. Summer research activities are especially important for students interested in competing in national competitions such as the Siemens

Competition in Math, Science & Technology or the Intel Science Talent Search. NCSSM-sponsored research programs are posted on the School's website while outside research opportunities are made available through individual academic departments and the Counseling Services Office.

## **DEPARTMENT OF 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. Our courses in fine arts challenge students to grow both as performing artists and as audience members. Many of our courses reflect the department's longstanding commitment to interdisciplinary approaches to teaching and learning. Our courses empower students to become the kind of leaders who have the flexibility of mind to think "outside the box" of discrete areas of knowledge, the keenness of vision to make connections, the confidence to challenge received wisdom, and the imagination, ingenuity, and energy to create original solutions to complex problems.

### **Graduation Requirement in Humanities**

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

### **COURSE OFFERINGS: Art**

#### **AR302 Art Applications**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

This course exposes students to four valuable art skills in one trimester. Drawing in pencil and pen and ink introduces students to concepts of right brain stimulation, seeing and analyzing reality, and interpreting reality by using abstract expression to respond to their personal feelings. All sections of the course begin with this foundation and then proceed to a varying sequence of other skills: screen-printing, photography, ceramics, or other media as determined by the instructor. Repeatable for credit.

#### **AR304 Ceramics**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

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

### **AR306 Photography**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Two periods per week.*

Students learn how to use 35 mm film cameras, how to develop their own film, and how to make photographic prints on paper. This class utilizes in-class demonstrations, instructor-assisted darkroom work, and independent student work so that students become confident in their abilities in conceiving and executing photographic prints. This course is primarily black-and-white film based photography. Repeatable for credit.

### **AR308 Graphic and Media Design**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

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

### **AR312 Acrylic Painting**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

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

### **AR314 Oil Painting**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

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

### **AR316 Digital Fine Art Photography**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

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

### **AR318 Mixed Media**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

In this course, students develop an inventive and experimental approach to a variety of media and examine how media, idea, and composition relate. Nontraditional uses of traditional materials are explored as well as the boundaries between painting and sculpture when nontraditional materials are incorporated in assemblage form. Repeatable for credit.

## **COURSE OFFERINGS: Drama**

### **DR302, DR304, DR306 Theater Performance Workshop**

*One trimester each*

*Credit: One unit each additional elective credit.*

*Meeting pattern: One 3-hour 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 the coinciding drama board theatrical production in some capacity. No prerequisites or previous experience is required. Repeatable for credit.

### **CROSS-LISTED COURSES**

Courses listed below are interdisciplinary courses in drama and at least one other subject area. Full course descriptions and credit information may be found in the areas indicated.

#### **IE318 Shakespeare in Performance**

Read description under Interdisciplinary Elective Courses.

#### **IE320 Science, Math, and Theater**

Read description under Interdisciplinary Elective Courses.

### **COURSE OFFERINGS: English**

#### **Graduation requirement in English**

All junior students must complete the three-trimester, interdisciplinary AS303 Writing and American Studies or AS305 American Studies, or be exempt. All students must complete an additional two trimesters of core English credit. Students who exempt the American Studies requirement must complete four units of core English credit and at least two units of history or social science.

#### **AS303a/AS303b/AS303c Writing and American Studies**

*One year*

*Credit: Two units core English credit, two units core history/social science credit, two units core elective credit.*

*Prerequisite: Placement by the Dean of Humanities.*

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

Writing and American Studies is a team-taught, interdisciplinary course that teaches students to read, write, and think about history, literature, and the visual arts as strands within the cultural fabric of the American past. The course begins with the first European encounters with “new” lands and peoples in the late fifteenth century. It concludes with the global economies and virtual communities of the present. In examining the American experience from multiple perspectives, students develop a more nuanced sense of what America is and what it means to be an American. This course in American Studies focuses on developing basic skills in reading, writing, and interpretation. Working collaboratively in small groups and with their teachers, students hone their skills in reading, in analyzing what they read, and in planning, developing, and writing the academic essay with precision, insight, and eloquence. Though



the program emphasizes the development of reading and writing skills, it is grounded in the same curricular content as AS305 American Studies and prepares students for NCSSM core English courses. During the second and third trimesters, students continue their exploration of the literary, historical, and artistic heritage of America, while at the same time focusing on continuing to build their strengths as readers and writers.

### **AS305a/AS305b/AS305c American Studies**

*One year*

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

### **EN352 African American Studies**

*One trimester*

*Credit: One unit core elective credit.*

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

This interdisciplinary course provides an introduction to African American history, literature, and culture. Students examine significant social, political, economic, and religious issues as well as issues of identity in the lives of African Americans from the sixteenth century to the present. In addition to readings in historical backgrounds and documents, students explore texts ranging from slave narratives, folktales, and spirituals to the works of writers, artists, and musicians during the Harlem Renaissance to contemporary works by such writers as Alice Walker and Henry Lewis Gates and filmmaker Spike Lee. Through a variety of assignments and activities, students continue to develop their skills in reading, research, critical thinking, speaking, and writing, with special emphasis on the academic essay.

### **EN354 Creative Writing Workshop**

*One trimester*

*Credit: One unit core elective credit.*

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

"There's nothing quite as hopeful as a blank sheet of paper," writer Daphne Athas once declared. In this course, students explore the possibilities of the blank page in fiction, poetry, and creative non-fiction. Students read and analyze canonical and contemporary works in these genres and they learn and practice fundamental writing techniques in exercises designed to help them find their way to their own stories, poems, and creative non-fiction. Students keep notebooks in which they record budding ideas, snatches of dialogue, reflections and observations, and other possible beginnings. Drafts are critiqued in class workshops and in individual conferences with the instructor. By the course's end, students submit portfolios of their best writing. The course culminates in the publication of students' work—in a class anthology, a website, individual chapbooks, or a public reading.

### **EN356 Introduction to Film Criticism: Auteur, Genre, and Style**

*One trimester*

*Credit: One unit core elective credit.*

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

In this course, through weekly film viewing, discussion, and readings, students learn the fundamentals of film criticism: how film techniques work and how they support meaning in film; how these techniques developed; how distinctive directors have used them to create signature films; and how the elements of film may also be considered in relation to a particular genre or style. Students demonstrate what they have learned through independent critical projects.

### **EN358 Modern Drama: Who's Afraid of Edward Albee?**

*One trimester*

*Credit: One unit core elective credit.*

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

This literature course examines works of modern European and American drama by authors such as Anton Chekhov, Jean Paul Sartre, Arthur Miller, Edward Albee, Lorraine Hansberry, and Tom Stoppard. Students use performance rehearsal techniques to explore the plays; but no acting experience or talent is required, only the willingness to stand and deliver with everyone else. Students also study film versions of some of the plays. This course further develops students' skills in reading, writing, critical thinking, research, and public speaking.

### **EN362 Classical Myth: Epic and Tragedy**

*One trimester*

*Credit: One unit core elective credit.*

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

Athena. Zeus. The abduction of Persephone. The fall of Troy. The wanderings and homecoming of Odysseus. For more than two thousand years, these stories of gods and mortals have gripped the imaginations of Western 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 texts. 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 in the course. 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.

### **EN402 British Literature to 1603**

*One trimester*

*Credit: One unit core English credit.*

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

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

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

#### **EN404 British Literature from 1603-1837**

*One trimester*

*Credit: One unit core English credit*

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

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

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

#### **EN406 British Literature from 1837 to Present**

*One trimester*

*Credit: One unit core English credit.*

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

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

This course explores British literature in the Age of Empire – and in the wake of the Empire's decline. Readings may include works by Victorian writers like the later Tennyson and Arnold, as well as Emily Brontë's *Wuthering Heights*, Bram Stoker's *Dracula*, Sheridan Le Fanu's *Carmilla*, and other works that allow us to think about changing perceptions of women, the social world, and the world of Nature. Literary Modernism is a central feature of the course, and readings include works by Joyce, Woolf, D.H. Lawrence, and others. Evelyn Waugh's *Brideshead Revisited* is a nostalgic look at the world and the way of life that was lost in two world wars. The course ends with modern poets such as Ted Hughes, Philip Larkin, and others. Grades are based on a variety of essays and tests.

### **EN410 Topics in Literature**

*One trimester*

*Credit: One unit core English credit.*

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

*Meeting pattern: Four periods per week.*

This course focuses on a selected period, genre, movement or theme in literature and addresses that topic through a variety of media. Students examine the influence of culture and literature through readings of varying length and genre. Film, music, and other cultural materials complete the students' perspectives and foster class discussion. Academic essays, personal essays, and independent projects allow students to demonstrate their understanding of context, both in terms of the works and in terms of their own relation to culture and identity. Topics for this course rotate. Check with the Registrar to confirm the topic for the coming academic year.

### **EN416 Asia I: Ancient Civilizations, Religions, and Philosophies**

*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 double-credit, interdisciplinary, team-taught course introduces students to ancient Asian civilizations through readings in historical and literary resources. The course traces the development of the early Indian, Chinese, and Japanese civilizations. Students also read texts from early religious and philosophical traditions, including Hinduism, Buddhism, Confucianism, and Daoism.

### **EN418 Asia II: Imperialism, Revolution, and Nationalism**

*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 double-credit, interdisciplinary, team-taught course focuses on Western influence and domination of South and East Asia through the post-colonial period and examines issues of imperialism, globalization, and nationalism using historical and literary works. We also analyze primary source documents,

literature, and the visual arts to explore influences on Asian cultures and the social and economic motivations for unrest and for emerging nationalist movements in the early twentieth century. Readings may include: *Monkey/Journey to the West*, *Dream of Red Mansions*, and Cultural Revolution literature; writings by Kipling, Roy, Ramakrishna, Vivekananda, and Tagore; and stories by Kobo Abe, Ishiguro, Mishima, and others.

### **EN420 Asia III: Modern Asian Cultures**

*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 double credit, interdisciplinary, team-taught course examines Asia from the middle of the twentieth century to present day by focusing on themes such as identity, diaspora, and environment within the context of growing wealth, development, and increasing global and cultural influence of the Asian world. We explore South, East, and Southeast Asia through the lenses of film, literature, oral histories, art, pop culture, and music, as well as traditional historical texts and narratives. The course emphasizes research, writing, and oral presentations.

### **EN424 Africa I: Critical issues in North, East, and West 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.*

This double-credit, interdisciplinary, team-taught course uses present-day critical issues in North, East, and West Africa as lenses for examining the history and culture of those regions. Starting with current issues such as the wave of political uprisings in North Africa and the Middle East, famine and drought in the Horn of Africa, and environmental concerns in the eastern Great Lakes and Niger River Delta, we explore the roots of these issues in such topics as climate and geography and their impacts on culture; the origin of humans and the development of human societies; the importance of oral traditions; ritual and cosmological belief systems; and the history of Judaism, Christianity, and Islam in the regions. We also explore the rise of Mediterranean and trans-Saharan trade networks, medieval West African kingdoms, the impact of the Atlantic slave trade, European colonization, anti-colonial movements, and independence and post-independence experiences. Literature from ancient poems and songs



to modern-day novels and short stories are examined. We explore the development of such nations as Egypt, Ethiopia, Algeria, Morocco, Mali, Nigeria, Ghana, Congo, Kenya, and Tanzania. Students develop and sharpen their skills in reading, critical thinking, academic writing, and they make rhetorical and oral presentations in both African and Western traditions.

#### **EN426 Africa II: Critical Issues in Central and Southern 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.*

This double-credit, interdisciplinary, team-taught course uses present-day critical issues in Central and Southern Africa as lenses for examining the history and culture of those regions. Starting with current issues such as the Civil War in the Congo, wildlife and resource conservation, and the HIV/AIDS epidemic, we explore the roots of these issues in such topics as climate and geography and their impacts on culture; the origin of humans and the development of human societies; the importance of oral traditions; and religious, ritual, and cosmological belief systems. We also explore the rise of trade networks along the tropical belt and the Swahili coast, medieval Southern and Central African kingdoms, the impact of the Atlantic slave trade, European colonization, anti-colonial movements, independence and post-independence experiences, and the rise and fall of the Apartheid system. Literature from ancient poems and songs to modern-day novels and short stories are examined. We explore the development of such nations as Namibia, Botswana, Congo, Angola, Zimbabwe, and South Africa. Students develop and sharpen their skills in reading, critical thinking, academic writing, and they make rhetorical and oral presentations in both African and Western traditions.

#### **EN430: Latin America I: Pre-Columbian and Colonial Periods**

*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 double-credit, interdisciplinary, team-taught course is a survey of Latin America from the pre-Columbian era to the early nineteenth century. Students explore the development of the Olmec, Mache, Nazca, Mayan, Incan, and Aztec civilizations, among others indigenous to the Americas in the eras prior to

European conquest. In addition, students investigate the cultures and worldviews of the Spanish and Portuguese in the century prior to their arrival in the Americas. Students confront foundational issues concerning religion, race, class, and gender during the imperial heyday of the Spanish and Portuguese empires. We also trace Latin America's colonial past through music, film, and poetry as well as through traditional literary and historical sources. Students sharpen their skills in reading, critical thinking, academic writing, and oral presentations. Students also complete a final project that involves interdisciplinary research, analysis, and presentation.

### **EN432 Latin America II: Revolution, Independence, and More Revolution**

*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 double-credit, interdisciplinary, team-taught course is a survey of Latin America from the wars of independence beginning in 1824 through the struggles of most countries in Latin America to develop strong, autonomous, national identities through the mid-twentieth century. Students examine how the experience of political independence differed from country to country in Latin America, what crises emerged in the nineteenth century as political and economic turmoil took its toll, and how Latin Americans coped with these changing circumstances and developed new perspectives on their culture and society and their place in the world. Students also explore the effects of the World Wars and Cold War on the emerging politics of Latin American countries. Sources include music, film, and poetry as well as traditional literary and historical sources. At least one novel or extensive work of classic Latin American literature is studied. Students also complete a final project that involves interdisciplinary research, analysis, and presentation.

### **EN434 Latin America III: Critical Issues in Modern Latin America**

*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 double-credit, interdisciplinary, team-taught course examines modern-day Latin America with a special emphasis on its long, complex relationship with the U.S. Although the time span of the course is largely focused on the aftermath of

the Cold War to the present day, some analysis is given to the early encounters and assumptions formed largely in the nineteenth century that created the foundation for relations between Latin America and its neighbors to the North. Students examine topics such as the devastating effects of the Cold War/Proxy wars in Latin America, the development of different cultures throughout the region, environmental concerns and crises affecting the resources and environment of Central and South America, the influx of Hispanic immigrants into North America, the development of Latino identity, the impact of the drug wars on all parts of the Americas, and new roles for Latin Americans in the twenty-first century. Texts for this course include modern periodicals and media, current analyses of the political, economic and cultural events of Latin America, as well as reports and materials on Hispanic and Latino life and culture in North America. Students participate in a research project/presentation investigating a current issue in Latin American life and culture.

### **EN436 Western European Cultural Studies I: Origins to 814**

*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 cultural fabric of the Western tradition. We start with the cave paintings at Lascaux and end with the birth of the Crusader ideology. We study literature, history, the visual arts, and philosophy as strands within the great tapestry of the Western past. 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 poetry by Vergil and the anonymous author of the *Song of Roland*, 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 emphasis on the life of the mind and reason, and why the idea of the individual develops as it does in the Western world.

### **EN438 Western European Cultural Studies II: 814 - 1650**

*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. EN436 WECS I suggested, not required.*

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

This course begins with the splintering of medieval Christendom and continues with the twelfth-century Renaissance, the rise of universities, and the philosophic debate over the nature and source of knowledge. We examine the development of national languages and vernacular literatures. We read life-writing by medieval Anchoresses who, by choice, spent their lives walled into tiny cells. We read Dante's *Inferno*, selections from Chaucer's *Canterbury Tales*, literary theorists like Boccaccio and Hugh of St. Victor, poems and letters by Petrarch, political treatises by Machiavelli, and plays by Shakespeare and Christopher Marlowe. We encounter characters like Dr. Faustus, who barter his soul for knowledge, and Hamlet and Macbeth, who find themselves imprisoned in the private spaces of their minds. The course concludes with Thirty Years' War and the English Civil War. We close with the philosophy of Descartes, who redefines the personal self, and with the poetry of the English Civil War and French Absolutism.

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

*One trimester*

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

*Prerequisite: Completion of three trimesters of AS303 Writing and American Studies or AS305 American Studies or completion of two trimesters of AS303 or AS305 and permission of the Dean of Humanities. EN436 WECS I and EN438 WECS II suggested, not required.*

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

This course explores the emergence of the modern world, the modern self, the modern state, the modern balance of power, and modern commercial enterprises and empires. Topics include the emergence of Romanticism, the alienating world of industrial culture, and new theories about nature and history. 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. Students sharpen their skills in reading, writing, and critical thinking. Readings include Rousseau, the English Romantics, Darwin, Marx, Kierkegaard, Baudelaire, Nietzsche, Heidegger, Virginia Woolf, and Joseph Conrad, as well as contemporary writers.

#### **EN442 Western Civilization: Wisdom, Revelation, Reason & Doubt I (The Ancient World to the High 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, team-taught course provides a survey of Western societies from the ancient world to the High Middle Ages. The course emphasizes skills in reading, writing, critical thinking, research, and public speaking. Through analyzing a variety of texts, students explore the cultures of the ancient Mesopotamians, Hebrews, Greeks, Romans, early Christians, and Europeans of the Middle Ages. Readings are selected from *The Epic of Gilgamesh*, the Old and New Testaments, and works by Homer, Aristophanes, Thucydides, Plato, Aristotle, Cicero, Vergil, St. Augustine, Thomas Aquinas, and Dante. Some questions the course addresses include: How have people organized their societies and why? How has religion shaped their lives? How has the individual been defined, and what have been the limits and possibilities for exercising free-will in different cultural contexts? How have people defined themselves in relationship to nature? How have ethical and moral systems been created, and how have they functioned? What has been the role of the arts in each culture? What are the lasting influences of these societies on the modern world?

#### **EN444 Western Civilization: Wisdom, Revelation, Reason & Doubt II (The Late 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, team-taught course provides a survey of Western societies from the Late Middle Ages to the Enlightenment. The course emphasizes skills in reading, writing, critical thinking, research, and public speaking. Through analyzing a variety of texts, students explore the Renaissance, Reformation, Scientific Revolution, and Enlightenment in Europe. Readings are selected from works by Chaucer, Machiavelli, Luther, Shakespeare, Galileo, Montaigne, Descartes, Hobbes, Locke, and Voltaire. Some questions the course addresses include: How have people organized their societies and why? How has religion shaped their lives? How has the individual been defined, and what have been the limits and possibilities for exercising free-will in different cultural contexts? How have people defined themselves in relationship to nature? How have ethical and moral systems been created, and how have they functioned? What has been the role of the arts in each culture? What are the lasting influences of these events and ideas on the modern world?

### **EN446 Western Civilization: Wisdom, Revelation, Reason & Doubt III (The Modern World)**

*One trimester*

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

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

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

This interdisciplinary, team-taught course provides a survey of modern Europe from the late eighteenth century to the present. The course emphasizes skills in reading, writing, critical thinking, research, and public speaking. Through analyzing a variety of texts, students explore the French Revolution, Romanticism, the Industrial Revolution, Imperialism, Modernism, Communism, Feminism, World Wars I & II, the Cold War, Existentialism, Post-Modernism, Globalization, and the European Union. Readings are selected from works by Rousseau, Mill, Marx, Jane Austen, Tolstoy, Nietzsche, Freud, Sartre, Virginia Woolf, and Tom Stoppard. Some questions the course addresses include: How have people organized their societies and why? How has religion shaped their lives? How has the individual been defined, and what have been the limits and possibilities for exercising free-will in different cultural contexts? How have people defined themselves in relationship to nature? How have ethical and moral systems been created, and how have they functioned? What has been the role of the arts in each culture? What are the lasting influences of these events and ideas on the world today?

### **CROSS-LISTED COURSES**

Courses listed below are interdisciplinary courses in English and at least one other subject area. Full course descriptions and credit information may be found in the areas indicated.

#### **IE318 Shakespeare in Performance**

Read description under Interdisciplinary Elective Courses.

#### **IE320 Science, Math, and Theater**

Read description under Interdisciplinary Elective Courses.

#### **IE354 Introduction to the Research Experience**

Read description under Interdisciplinary Elective Courses.

#### **IE356 Engineering the Modern: The Twentieth-Century American Aesthetic in its Cultural and Historical Context**

Read description under Interdisciplinary Elective Courses.



## **COURSE OFFERINGS: History and Social Sciences**

### **Graduation requirement in History and Social Sciences**

Each junior is required to complete the three-trimester, interdisciplinary AS303 Writing and American Studies or AS305 American Studies (described under [Course Offerings: English](#)), or be exempt. Students who exempt the American Studies requirement must complete four units of core English credit and at least two units of history or social science. Students who wish to take the Advanced Placement United States History examination, and who meet the prerequisite, should enroll in SS420 AP United States History (I) and SS422 AP United States History (II) in the winter and spring terms, respectively. These are *additional electives* (not “core”) and may be taken in addition to the five core courses required for full enrollment.

### **SS356 World Religions**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Four periods per week.*

This introductory course focuses on major religions of the world during the last four thousand years: the older Hinduism, Buddhism, and Daoism; the relatively newer Judaism, Christianity, and Islam; and some smaller, lesser-known religions. Phenomena of religious experience will also be considered. Students read and discuss selections from primary texts about the origins, basic concepts, practices, and history of these religions.

### **SS358 International Relations**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Completion of at least two trimesters of AS303 Writing and American Studies or AS305 American Studies.*

*Meeting pattern: Three periods per week including lab or two 90-minute evening class meetings.*

What does the Stuxnet virus portend for future U.S. relations with Iran? How can we understand the myriad factors contributing to the outbreak of WWI? What are the causes and consequences of increased forms of globalization? International Relations (IR) introduces students to the formal study of international political questions such as these, focusing on the broad subject areas of international security and economics. In this course, students learn about the primary actors, their various instruments, and their common interactions. This course offers students a conceptual toolbox for framing international interactions and analyzing their causes and consequences. Major

activities include a group project, a paper linking IR theory with current events, a documentary viewing, discussions of current events, and other assignments.

### **SS360 Topics in History and Social Science**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Completion of at least two trimesters of AS303 Writing and American Studies or AS305 American Studies.*

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

This course focuses on a specific discipline or subject within the fields of history or social science. Students continue to hone the critical thinking skills they develop in their core required humanities courses, and they gain further practice in writing the academic essay. Content and methodology will change annually, based upon the topic for the academic year.

### **SS362 Twentieth-Century Philosophy**

*One trimester*

*Credit: One unit core elective credit.*

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

This is a course on philosophy and its cultural context from 1840 to the present. We begin in the 1840s and 1850s with figures like Kierkegaard, who is perhaps the first philosopher to articulate the problem of existence and the possibility that life may be meaningless. Kierkegaard's emphasis on choice and on faith contrasts markedly with a figure like Nietzsche, who proclaimed the death of God and who interprets the concepts of choice and will in a sharply different way. Our work also involves examining the transformations in what Stephen Kern has called the "culture of time and space," and how changes in views of the physical universe are reflected in Heidegger's philosophy of being and time. Later in the trimester, we examine Adorno and Horkheimer's analysis of the nihilistic elements in the legacy of the Enlightenment and their critique of the "culture industry," along with Michel Foucault's theory of power and its dynamics. Toward the end of the course, we read works like Judith Butler's *Gender Trouble* and examine the social construction of gender. We also examine the philosophic novel and read works by Jean-Paul Sartre, Georges Bernanos, and Dostoevsky. Grades are based on a variety of reading commentaries and essays. Classes are organized like seminars and are discussion-based, with students often taking the lead on various philosophic topics.

### **SS368 Introductory Sociology**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Four periods per week.*

This course provides an understanding of the impact of society on the individual and the impact of the individual on society. Topics include: socialization, deviance, social class, inequality, family/life course, population changes, and health care. This course also focuses on various levels of power and inequality and their impacts on groups, organizations, and multinational corporations. Finally, the course examines the various stages of social change over the course of history.

### **SS370 Islamic Civilization**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Four periods per week.*

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, visiting the vibrant, diverse cultural regions collectively known as the “Islamic World,” where Islam has been the predominant religion since its expansion in the eighth century CE. Using an interdisciplinary approach incorporating the fields of religion, science, mathematics, art history, pop culture, and anthropology, we examine the development of the religion and the spread of empire, including the achievements of the Golden Age from “A to Q” — that is, from algebra to the Qu’ran. Other topics include divergences within Islam, popular faith and practice, global Islamic movements, and recent political developments.

### **SS402 AP Microeconomics (I)**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Two 75-minute evening class meetings.*

This course offers students an opportunity for immersion in both 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 very essence of the discipline itself. Students pursue this topic through three case studies or strategic problems involving pricing issues in product markets, various market structures, and through industrial and social regulation within both an historic and contemporary environment. 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 (I)**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Two 75-minute evening class meetings.*

This course offers an opportunity for immersion in both a fascinating discipline and in logical thinking. This immersive process involves not only Macroeconomic theory but investigations into the very essence of the discipline itself through three 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 three experiences are researched within the context of a fourth, trimester-long problem in the simulated trading of financial instruments and strategic commodities in our Paratrade environment. This longer, overarching problem allows us the opportunity to apply recently acquired Macroeconomic theory to a simulated real-world environment.

### **SS406 AP Psychology (I)**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Four periods per week.*

This course provides an introduction to the scientific study of behavior and consciousness. Key topics include the neurobiological basis of behavior, perception, consciousness, learning, memory, and thinking. We also explore motivation, personality, normal and abnormal behavior, psychotherapy, and social factors in behavior.

### **SS410 AP Psychology (II)**

*One trimester*

*Credit: One unit core elective credit.*

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

*Meeting pattern: Four periods per week.*

This course prepares students to take the Advanced Placement examination through an in-depth introduction to the scientific study of behavior and consciousness. Key topics include the neurobiological basis of behavior, perception, consciousness, learning, memory, and thinking. We also explore motivation, personality, normal and abnormal behavior, psychotherapy, and social factors in behavior.

### **SS411a /SS411b AP European History**

*Two trimesters*

*Credit: Two units core elective credit.*

*Prerequisite: B or higher grade in AS303 Writing and American Studies or AS305 American Studies or permission of Dean of Humanities.*

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

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

### **SS412 AP Microeconomics/AP Macroeconomics (II)**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Successful completion of SS402 AP Microeconomics (I) or SS404 AP Macroeconomics (I) or permission of Dean of Humanities.*

*Meeting pattern: Two 75-minute evening class meetings.*

This course investigates the dynamics of the contemporary global market system in both a theoretical and an historical context. 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 cultural economics. Thus, the course can serve both as an introduction to the study of Economics and as a holistic review for the Advanced Placement examinations in Micro and Macroeconomics.

### **SS420 AP United States History (I)**

*One trimester*

*Credit: One unit additional elective credit.*

*Prerequisite: B or higher grade in AS303a Writing and American Studies or AS305a American Studies or permission of Dean of Humanities.*

*Meeting pattern: One period per week or one 50-minute evening class meeting.*

This course provides in-depth coverage of United States history from the colonial era to the present. This class is a supplement to the American Studies course and offers an intense preparation for the AP United States History exam. This is a blended-instruction course that meets one period each week and includes significant web-based content and out-of-class assignments. Emphasis is on developing and enhancing analytical, writing, and rhetorical skills through the use of document-based questions (DBQs), free-response essays, and frequent objective/analytical test questions. Students analyze and critically review primary and secondary source materials.

### **SS422 AP United States History (II)**

*One trimester*

*Credit: One unit additional elective credit.*

*Prerequisite: B or higher grade in SS420 AP United States History (I).*

*Meeting pattern: One period per week or one 50-minute evening class meeting.*

This course continues the intense preparation for the AP United States History exam begun in SS420 AP United States History (I). This is a blended-instruction course that meets one period each week and includes significant web-based content and out-of-class assignments. Emphasis is on developing and enhancing analytical, writing, and rhetorical skills through the use of document-based questions (DBQs), free-response essays, and frequent objective/analytical test questions. Students analyze and critically review primary and secondary source materials.

### **CROSS-LISTED COURSES**

Courses listed below are interdisciplinary courses in history/social science and at least one other subject area. Full course descriptions and credit information may be found in the areas indicated.

#### **AS303 Writing and American Studies**

Read description under English.

#### **AS305 American Studies**

Read description under English.

#### **EN352 African American Studies**

Read description under English.

#### **EN362 Classical Myth: Epic and Tragedy**



Read description under English.

**EN416 Asia I: *Ancient Civilizations, Religions, and Philosophies***

Read description under English.

**EN418 Asia II: *Imperialism, Revolution, and Nationalism***

Read description under English.

**EN420 Asia III: *Modern Asian Cultures***

Read description under English.

**EN424 Africa I: *Critical Issues in North, East, and West Africa***

Read description under English.

**EN426 Africa II: *Critical Issues in Central and Southern Africa***

Read description under English.

**EN430 Latin America I: *Pre-Columbian and Colonial Periods***

Read description under English.

**EN432 Latin America II: *Revolution, Independence, and More Revolution***

Read description under English.

**EN434 Latin America III: *Critical Issues in Modern Latin America***

Read description under English.

**EN436 Western European Cultural Studies I: *Origins to 1000 C.E.***

Read description under English.

**EN438 Western European Cultural Studies II: *1000-1650***

Read description under English.

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

Read description under English.

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

Read description under English.

**EN444 Western Civilization: *Wisdom, Revelation, Reason & Doubt I (The Late Middle Ages to the Enlightenment)***

Read description under English.

**EN446 Western Civilization: Wisdom, Revelation, Reason & Doubt III (The Modern World)**

Read description under English.

**IE309 Introduction to Entrepreneurship**

Read description under Interdisciplinary Elective Courses.

**IE310 World Music**

Read description under Interdisciplinary Elective Courses.

**IE312 History of Western Music**

Read description under Interdisciplinary Elective Courses.

**IE314 American Popular Song**

Read description under Interdisciplinary Elective Courses.

**IE316 Twentieth-Century Music History**

Read description under Interdisciplinary Elective Courses.

**IE318 Shakespeare in Performance**

Read description under Interdisciplinary Elective Courses.

**IE320 Science, Math, and Theater**

Read description under Interdisciplinary Elective Courses.

**IE350 Medical Ethics and Leadership**

Read description under Interdisciplinary Elective Courses.

**IE352 Environmental Ethics and Leadership**

Read description under Interdisciplinary Elective Courses.

**IE354 Introduction to the Research Experience**

Read description under Interdisciplinary Elective Courses.

**IE356 Engineering the Modern: The Twentieth-Century American Aesthetic in its Cultural and Historical Context**

Read description under Interdisciplinary Elective Courses.

### **IE360 Global Understanding**

Read description under Interdisciplinary Elective Courses.

### **IE450 Applications in Entrepreneurship**

Read description under Interdisciplinary Elective Courses.

## **COURSE OFFERINGS: Music**

### **Music Instruction, Theory, and Production**

#### **MS306, MS308, and MS310 Jazz Improvisation**

*One trimester*

*Credit: One unit each additional elective credit.*

*Meeting Pattern: Two periods per week plus one 100-minute evening class meeting.*

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

#### **MS312, MS314, MS316 Classical Piano and Guitar Theory and Practice**

*One trimester*

*Credit: One unit each additional elective credit.*

*Meeting pattern: Three periods per week.*

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

**MS322 Music Theory and Composition**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

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

**MS332 Audio Recording Technology**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

This course focuses on “hands-on” discovery of concepts in acoustics, creativity, and music production. Topics include: principles of acoustics, microphones, microphone techniques, the recording chain, signal flow, digital recording, mixing consoles, and mixing theory. Each student completes multiple recording projects during the trimester.

**MS334 Digital Music Production**

*One trimester*

*Credit: One unit additional elective credit.*

*Meeting pattern: Three periods per week.*

This course employs “hands-on” discovery of concepts in music production in the digital realm. Topics include: music production, editing, effects and dynamics processing, stereo and multi-track editing, step sequencing, looping, mastering, and open source software applications. Each student completes multiple recording sequencing and editing projects throughout the trimester.

**MS364 Advanced Audio Recording Technology**

*One trimester*

*Credit: One unit additional elective credit.*

*Prerequisite: MS332 Audio Recording Technology or MS334 Digital Music Production.*

*Meeting pattern: Three periods per week.*

This course is a continuation of MS332 Audio Recording Technology and of MS334 Digital Music Production. This course includes advanced topics such as

multi-track digital editing, advanced mixing theory, a variety of recording sessions, and live sound support. Students are expected to complete a major recording project during the course of the trimester.

### **MS402 AP Music Theory**

*One trimester*

*Credit: One unit additional elective credit.*

*Prerequisite: MS322 Music Theory and Composition.*

*Meeting pattern: Three periods per week.*

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

### **Musical Performance**

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

### **MU302, MU304, MU306 Chorale**

*One trimester each*

*Credit: One unit each additional elective credit.*

*Prerequisite: Previous musical experience in chorus, band, orchestra, voice, or piano.*

*Meeting pattern: Two 100-minute evening class meetings. Some scheduled weekend rehearsals and weekend concerts.*

The Chorale is a vocal ensemble that studies and performs a variety of standard choral literature. This ensemble performs masterworks of choral literature in collaboration annually with other NCSSM musical ensembles. Concepts emphasized include ensemble techniques, vocal production, solfeggio, note

reading, and other aspects of choral music. Interested students are encouraged to register for all three trimesters of this course. Repeatable for credit.

### **MU314, MU316, MU318 Wind Ensemble**

*One trimester each*

*Credit: One unit each additional elective credit.*

*Prerequisite: Previous musical experience on woodwind, brass, or percussion instruments.*

*Meeting pattern: Two periods per week including lab plus one 100-minute evening class meeting. Some scheduled weekend rehearsals and weekend concerts.*

Wind Ensemble is an advanced wind band with an emphasis on both wind band and wind chamber music literature. 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.

### **MU320 Pep Band**

*One trimester*

*Credit: One unit additional elective credit.*

*Prerequisite: Previous experience in band or instrumental music.*

*Meeting pattern: One 100-minute evening class per week and home basketball games.*

Pep Band includes the study and performance of pep band and marching band music. Students have performance opportunities as a pep band at home basketball games. Student leaders receive instruction and experience in rehearsal and conducting techniques. Students also have opportunities to arrange music for the Pep Band. Repeatable for credit.

### **MU332, MU334, MU336 Orchestra**

*One trimester each*

*Credit: One unit each additional elective credit.*

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

*Meeting pattern: Two periods per week including lab plus one 100-minute 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.

### **CROSS-LISTED COURSES**

Courses listed below are interdisciplinary courses in music and at least one other subject area. Full course descriptions and credit information may be found in the areas indicated.

#### **IE310 World Music**

Read description under Interdisciplinary Elective Courses.

#### **IE312 History of Western Music**

Read description under Interdisciplinary Elective Courses.

#### **IE314 American Popular Song**

Read description under Interdisciplinary Elective Courses.

#### **IE316 Twentieth-Century Music History**

Read description under Interdisciplinary Elective Courses.

### **COURSE OFFERINGS: World Languages**

#### **WORLD LANGUAGES**

To meet the graduation requirement in world languages, students must complete through the intermediate level or higher of a language at NCSSM. Students who wish to enroll in the intermediate level or higher of French or Spanish in the junior year are required to take a placement test in that language prior to enrolling in the course. Placement for the intermediate level or higher of Chinese, Japanese, or Latin is based upon an intake form and the student's previous study of the language. Students who begin a new language in the junior year must continue that language in the senior year, regardless of prior world language credits. Unless exempted (see **Graduation Requirements and Exemption Criteria**), every student must complete three units of world language during the junior year. Students who qualify to exempt the NCSSM World Language requirement are not required to take additional language courses at NCSSM.

Level one and advanced level offerings depend upon student interest and staff availability.

### **CN305a/CN305b/CN305c Introductory Chinese**

*One year*

*Credit: Three units core World Language credit.*

*Meeting pattern: Four periods per week.*

Introductory Chinese is designed to provide 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 writing system (radicals and stroke order) is introduced and computers are used to help students develop their character recognition skills. The course is proficiency-based and focus is on the development of aural and oral skills. By the third trimester, class is conducted entirely in Chinese.

### **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.*

Intermediate Chinese is designed for students who are able to carry out simple conversations about everyday topics in Mandarin. Students are expected to have mastery of pinyin, knowledge of stroke order, and recognition of approximately 45 radicals and 200 characters. The focus continues to be on the development of aural and oral skills, with the specific goals of expanding vocabulary, strengthening listening and comprehension, and exposing students to more complex sentence patterns. There is an additional focus on word/character analysis and reading strategies. The course is proficiency-based and class is conducted entirely in Chinese. This course is generally not suitable for Chinese heritage speakers, those who grew up speaking or hearing Mandarin, who attended weekend Chinese school, or who are able to converse comfortably in Mandarin for ten minutes. Such students should select to study a different language at NCSSM or, if they wish, apply for exemption from the NCSSM World Language graduation requirement.

### **FR305a/FR305b/FR305c Introductory French**

*One year*

*Credit: Three units core World Language credit.*

*Meeting pattern: Four periods per week.*

Emphasis in this first-year course is placed on the acquisition of basic language skills: speaking, listening, comprehension, reading, and writing. Students acquire



a base vocabulary and learn the simple grammatical constructions needed for essential communication. Cultural aspects of French-speaking peoples are also introduced. Students have access to web-based exercises, videos, and the language lab to aid them in the acquisition of grammatical concepts and new vocabulary.

### **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.*

This is an accelerated second-year French course. 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.

### **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. 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 on reading and writing, and students read excerpts of literary and journalistic writings. Short compositions on these writings are also emphasized. A large part of FR358 Advanced French III is dedicated to reading and studying Antoine de Saint Exupery's novel *Le Petit Prince*. Short videos, films, and songs are also used to enhance students' 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.*

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

**JA305a/JA305b/JA305c Introductory Japanese**

*One year*

*Credit: Three units core World Language credit.*

*Meeting pattern: Four periods per week.*

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

**JA307a/JA307b/JA307c Intermediate Japanese**

*One year*

*Credit: Three units core World Language credit.*

*Prerequisite: JA305 Introductory Japanese or equivalent, or permission of the Dean of Humanities.*

*Meeting pattern: Four periods per week.*

Emphasis on basic language skills and grammatical construction is continued. Students' competency 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.*

Emphasis in this first-year course is placed on knowing verbs and nouns as they are conjugated or declined in hundreds of distinct forms and as they make up ordered sentences with the help of pronouns, adverbs, adjectives, prepositions, and conjunctions. Students acquire skill in paying attention to the detail of each word while keeping in mind the larger systems that each word belongs to. Students also find modern derivatives of ancient Latin words, learn elements of Roman culture, recite daily, and diagram sentences while translating them.

### **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.*

This is an accelerated second-year Latin course. Emphasis on verb and noun forms continues and includes study of the subjunctive mood, infinitives, participles, gerunds, and dependent clauses. Students diagram and translate selections from Book I of Caesar's *Commentaries on the Gallic War*. Students learn a wider range of words, particularly in relation to ancient Gaul and the Roman legions, as they continue to recite daily.

### **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.*

These three one-trimester courses constitute a third-year or higher level of Latin study. Emphasis on the grammatical order of sentences continues as students practice scanning, reading poetry aloud, translating, and recognizing poetic figures of speech. Students read selections from Ovid's *Metamorphoses* and the lyric poetry of Catullus and Horace. Students also develop a finer sense of beauty, a fuller insight into human emotion, and a readier sense of humor.

### **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.*

These three one-trimester courses constitute a third-year or higher level of Latin study. Emphasis on the grammatical order of sentences continues as student's practice reading prose aloud, translating, and recognizing rhetorical figures of speech. Students read selections from Caesar, Sallust, Cicero, and Cato the Younger. Students also develop a greater awareness of ancient history, a clearer sense of persuasive logic, and a readier sense of drama.

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

### **SP305a/SP305b/SP305c Introductory Spanish**

*One year*

*Credit: Three units core World Language credit.*  
*Meeting pattern: Four periods per week.*

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 write and speak in Spanish at an elementary level about self, family, friends, and everyday activities in the present tense and with a limited number of high frequency verbs in the past tense. 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 in the present tense. Cultural aspects of the Spanish-speaking world are also introduced. Students have access to web-based exercises, video activities, and the language lab to aid them in the acquisition of grammatical concepts and new vocabulary.

### **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.*

This is an accelerated second-year Spanish course. This course is for students who have had a full year of introductory Spanish study in high school or equivalent exposure to the language. Students learn to write and speak in Spanish at an intermediate level about self, family, friends, and everyday activities in the past tense. Emphasis on basic language skills and grammatical construction is continued. Reading short texts, viewing video programs, and using the language in everyday conversational situations further increases students' competency in the language. Most of the basic grammatical constructions are learned. Exploration of cultural aspects of the Spanish-speaking world is continued. Students have access to web-based exercises, video activities, and the language lab to aid them in the acquisition of grammatical concepts and new vocabulary.

### **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.*

These three one-trimester courses constitute a third-year level of Spanish study and are conducted entirely in the language. The series is designed for students who have completed through the intermediate level of high school Spanish. The first course, SP354, offers some grammatical review, but greater emphasis is on the introduction and practice of more advanced grammatical concepts and vocabulary in context. Through a variety of audio and video programs that correlate to the themes in the course, students develop listening comprehension. Class and language lab activities emphasize communication skills, allowing students to interact and apply what they are learning. Web-based activities provide additional language exercise. These courses also include readings of varying degrees of difficulty with an emphasis on cultural, social, historical, and literary topics. These then form the basis for development of composition skills 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.*

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 Hispanic literature, culture, and society through a variety of genres, including brief narratives, descriptions, short stories, poetry, plays, and the arts. Students develop an advanced vocabulary and improved reading comprehension. They develop their writing skills to include personal and descriptive narratives;

they explore different points-of-view and forms of creative expression. They learn to edit their writing through peer editing, by using an editing key, and through re-writes. Students review grammatical structures, make oral presentations, and discuss and write about the issues and themes from the readings.

**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 Hispanic Literature 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.*

Conducted entirely in the language, 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 be enrolled in a mathematics course for five trimesters of study at NCSSM. 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.

## **MA305a/MA305b/MA305c Precalculus and Modeling**

*One year*

*Credit: Three units core mathematics credit.*

*Prerequisite: MA301 Algebra 3, or Algebra 2 and adequate score on the mathematics placement test.*

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

This course is devoted to developing a toolkit of functions that serves as a bridge between mathematics and the world it models. The toolkit includes explicitly defined functions such as exponential, polynomial, logarithmic, and trigonometric functions, as well as functions that are defined recursively and parametrically. Students investigate functions, bivariate data, and models with graphing calculators and computers. Both graphical and analytical



approaches to problem solving are emphasized. Students also complete lab activities and present their results in formal written reports.

### **MA355a/MA355b/MA355c Precalculus and Modeling with Advanced Topics**

*One year*

*Credit: Three units core mathematics credit.*

*Prerequisite: MA301 Algebra 3 and permission of the Dean of Mathematics, or Algebra 2 and adequate score on the mathematics placement test.*

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

The topics and ideas of MA305 Precalculus and Modeling are presented in greater depth and at a faster pace. Some topics are explored more extensively, and additional topics are selected to supplement the course materials. Students are expected to work more independently than they would in MA305.

### **MA368 Finite Mathematics**

*One trimester*

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

*Prerequisite: At least two trimesters of MA305 Precalculus and Modeling.*

*Meeting pattern: Four periods per week.*

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

### **MA370 Advanced Algebra Applications**

*One trimester*

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

*Prerequisite: MA305 Precalculus and Modeling.*

*Meeting pattern: Four periods per week.*

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

and figures in the plane, or others. This course is intended for students who have not taken calculus.

### **MA372 Explorations in Advanced Geometry**

*One trimester*

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

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

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

### **MA404 AP Statistics (I)**

*One trimester*

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

*Prerequisite: MA305 Precalculus and Modeling or permission of the Dean of Mathematics.*

*Meeting pattern: Four periods per week.*

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

### **MA406 AP Statistics (II)**

*One trimester*

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

*Prerequisite: Final grade of C or higher in MA404 AP Statistics (I).*

*Meeting pattern: Four periods per week.*

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

### **MA408 AP Statistics (III)**

*One trimester*

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

*Prerequisite: Final grade of C or higher in MA406 AP Statistics (II).*

*Meeting pattern: Four periods per week.*

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

MA404, MA406, MA408 constitute a comprehensive introduction to statistics and include all of the topics on the AP Statistics syllabus.

### **MA410 AP Calculus AB (Advanced Topics I)**

*One trimester*

*Credit: One unit core mathematics credit.*

*Prerequisite: Final grade of B- or higher in MA305 Precalculus and Modeling or permission of the Dean of Mathematics.*

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

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

### **MA412 AP Calculus AB (Advanced Topics II)**

*One trimester*

*Credit: One unit core mathematics credit.*

*Prerequisite: Final grade of C or higher in MA410 AP Calculus AB (Advanced Topics I).*

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

This course continues the study of calculus and its applications to mathematical modeling. Through class discussions, problem solving, laboratory experiences, and writing assignments students discover the important concepts of calculus, develop an understanding of these concepts, and use these concepts in solving

realistic problems. This course generally includes the completion of a substantial mathematical modeling project. Calculators and computers are used as tools in the course. Topics normally covered include applications of the derivative, Euler's method, implicit differentiation and related rates, and the concepts of definite and indefinite integrals.

### **MA414 AP Calculus AB (Advanced Topics III)**

*One trimester*

*Credit: One unit core mathematics credit.*

*Prerequisite: Final grade of C or higher in MA412 AP Calculus AB (Advanced Topics II).*

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

This course continues the study of calculus and its applications to mathematical modeling. Through class discussions, problem solving, laboratory experiences, and writing assignments students discover the important concepts of calculus, develop an understanding of these concepts, and use these concepts in solving realistic problems. This course generally includes the completion of a substantial mathematical modeling project. Calculators and computers are used as tools in the course. Topics normally covered include basic techniques of integration, calculating area and total change of a function, numerical approximations of integrals, separable differential equations, and other applications of definite integrals.

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

### **MA420 AP Calculus BC (I): Contemporary Calculus**

*One trimester*

*Credit: One unit core mathematics credit.*

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

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

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

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

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

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

*One trimester*

*Credit: One unit core mathematics credit.*

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

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

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

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

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

*One trimester*

*Credit: One unit core mathematics credit.*

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

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

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

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

*One trimester*

*Credit: One unit core mathematics credit.*

*Prerequisite: Final grade of B- or higher in MA430 AP Calculus BC (Advanced Topics I).*

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

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

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

*One trimester*

*Credit: One unit core mathematics credit.*

*Prerequisite: Final grade of B- or higher in MA432 AP Calculus BC (Advanced Topics II).*

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

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

MA430, MA432, and MA434 constitute a comprehensive study of calculus and include all of the topics on the AP Calculus BC syllabus.

### **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 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 Networks**

*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 discrete mathematics. The theory and applications of planar graphs, graph colorings, trees and path optimization, and networks are studied. The course places an emphasis on developing valid mathematical arguments. 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<sup>th</sup> or 10<sup>th</sup> grade. 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.

### **CROSS-LISTED COURSES**

Courses listed below are interdisciplinary courses in mathematics and at least one other subject area. Full course descriptions and credit information may be found in the areas indicated.

#### **EE350 Introduction to Engineering – Mechanical**

Read description under Program in Applied Sciences.

#### **EE352 Introduction to Engineering – Electrical**

Read description under Program in Applied Sciences.

#### **EE354 Architecture and Civil Engineering**

Read description under Program in Applied Sciences.

#### **EE404 Statics**

Read description under Program in Applied Sciences.

#### **IE374 Research Experience in Applied Chemistry and Engineering**

Read description under Interdisciplinary Elective Courses.

**IE376 Research Experience in Mathematical Chemistry**  
Read description under Interdisciplinary Elective Courses.

## **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 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.

### **COURSE OFFERINGS: Biology**

#### **Graduation Requirement in Biology**

The graduation requirement in biology may be fulfilled by successful completion of two trimesters of any of the biology courses listed in this section. The biology course offerings address four general topical areas, with some courses overlapping topical areas: genetics (BI358, BI360, BI364, BI370, BI402, BI434, BI436); human body (BI352, BI364, BI416, BI422, BI438); cellular biology (BI360, BI410, BI422, BI434); and environmental biology (BI374, BI400, BI404, BI424, BI426). The research in biology sequence (BI442, BI444, BI446, BI448) may also be used to meet the core biology requirement for students selected to this program.

#### **BI352 Anatomy & Physiology I**

*One trimester*

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

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

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



**BI358 Classical Genetics**

*One trimester*

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

*Corequisite: MA305 Precalculus and Modeling.*

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

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

**BI360 Molecular Genetics**

*One trimester*

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

*Corequisite: MA305 Precalculus and Modeling.*

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

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

**BI364 Developmental Biology**

*One trimester*

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

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

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

**BI370 Evolution**

*One trimester*

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

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

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

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

**BI374 Ecology**

*One trimester*

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

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

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

**BI400 Aquatic Ecology**

*One trimester*

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

*Prerequisite: Completion of BI374 Ecology.*

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

Aquatic ecology is the study of abiotic and biotic factors that influence the structure and dynamics of aquatic ecosystems. It includes the chemical, physical, and biological characteristics of streams, lakes, estuaries, and intertidal zones. Special emphasis is placed on adaptations to aquatic environments, energy flow in food webs, and the role of humans in altering aquatic ecosystems. Students learn about ongoing research in aquatic ecology and gain experience making field observations, designing experiments, and

analyzing data to test hypotheses. Regular outdoor experiences, both on and off campus, expose students to a variety of aquatic ecosystems.

### **BI402 Evolution with Advanced Topics**

*One trimester*

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

*Corequisite: MA305 Precalculus & Modeling.*

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

In this course students learn about genetics at the population level and start the course by identifying and quantifying variation in populations. Evolutionary processes, such as natural selection, drift, mutation, migration, and non-random mating are studied alone and in all possible combinations. Students explore how natural selection produces adaptations at the morphological and molecular levels. The course concludes with a study of macro evolutionary patterns including speciation. In contrast to BI370 Evolution, this course is faster-paced, places more emphasis on mathematical models, and requires more independent learning.

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

### **BI404 Climate Change Biology**

*One trimester*

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

*Prerequisite: Completion of a precalculus course, or a computer science course or permission of the Dean of Science.*

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

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

### **BI410 Molecular and Cellular Biology**

*One trimester*

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

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

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

The first portion of this course examines biochemical principles and the structure and properties of lipids, proteins, and carbohydrates. Students then examine

cellular structure and function common to most eukaryotic organisms. Topics include cellular components, membrane function, energetics, and enzyme function. Laboratory activities are designed to develop critical thinking skills and thoughtful data interpretation.

### **BI416 Anatomy and Physiology II**

*One trimester*

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

*Prerequisite: BI352 Anatomy and Physiology I or BI364 Developmental Biology, or permission of the Dean of Science.*

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

Building upon the concepts learned in BI352 Anatomy and Physiology I, this course provides an in-depth study of the neural and hormonal control of the human body. Topics include homeostasis, the disease-state, the nervous and endocrine systems, as well as the major organ systems discussed in BI352 Anatomy and Physiology I. The laboratory component of the course explores physiological concepts via experimentation.

### **BI422 Immunology**

*One trimester*

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

*Prerequisite: BI360 Molecular Genetics, or BI410 Molecular and Cellular Biology, or BI434 AP Biology (I), or permission of the Dean of Science.*

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

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

### **BI424 AP Environmental Science (I)**

*One trimester*

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

*Prerequisite: One course in biology and one course in chemistry, or one course in biology and one trimester of NCSSM chemistry, or permission of the Dean of Science.*

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

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

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

### **BI434 AP Biology (I)**

### **BI436 AP Biology (II)**

### **BI438 AP Biology (III)**

*One trimester each*

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

*Prerequisite: Senior standing and completion of a general biology course and a chemistry course with a final grade of B or higher. Juniors who have completed a general biology course and a chemistry course with a grade of A or higher and permission of the Dean of Science may also qualify.*

*Meeting pattern: BI434 – four periods per week including lab, BI436 – five periods per week including lab, BI438 – four periods per week including lab.*

This course is a survey of all areas of biology. It is divided into three terms. In BI434 students investigate molecular and cellular biology as well as Mendelian genetics. BI436 includes DNA science, evolutionary biology, and phylogeny. BI438 covers organisms and populations. This course has a strong laboratory emphasis, which includes the twelve laboratories suggested by the AP. Students may enroll in and receive credit for any, or all, of these one-trimester courses.

### **BI442 Research in Biology I**

*One trimester*

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

*Prerequisite: Permission of the Dean of Science.*

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

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

### **BI444 Research in Biology II**

*One trimester*

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

*Prerequisite: Final grade of B or higher in BI442 Research in Biology I, or successful participation in a summer research program, and permission of the Dean of Science.*

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

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

### **BI446 Research in Biology III**

*One trimester*

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

*Prerequisite: Final grade of B or higher in BI444 Research in Biology II and permission of the Dean of Science.*

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

Students continue work on their previous research to produce additional data and conduct statistical analysis, as needed. They may research extension questions based on their original work. Students write a formal research paper and prepare a formal presentation. Students are required to present their results at the NCSSM Research Symposium in the spring and are encouraged to present their research at the North Carolina Student Academy of Science competition and other competitions.

## **BI448 Research in Biology IV**

*One trimester*

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

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

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

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

## **COURSE OFFERINGS: Chemistry**

### **Graduation Requirement in Chemistry**

The graduation requirement in chemistry may be fulfilled by successful completion of CH305 Chemistry by Inquiry, CH307 Chemistry, CH401 AP Chemistry (I), or CH405 AP Chemistry (Advanced I). Students with an AP score of 4 may request to meet the graduation requirement in chemistry by taking two trimesters of chemistry core electives, rather than the chemistry core subject courses.

### **Placement**

**Junior students** are placed in their NCSSM chemistry course based on scores on the NCSSM chemistry placement test, NCSSM physical science placement test, and NCSSM mathematics placement. Depending on placement information, students who have had one year of chemistry before coming to NCSSM may be enrolled in CH305 Chemistry by Inquiry, CH307 Chemistry, CH401 AP Chemistry (I), or CH405 AP Chemistry (Advanced I). Students who have not had a year of high school chemistry before coming to NCSSM may be enrolled in CH305, CH307 or CH401. **Senior students** taking MA430 AP Calculus BC (Advanced Topics I) or higher level mathematics, who have completed a previous chemistry course, will be enrolled in CH401 or CH405.

### **CH305a/CH305b/CH305c Chemistry by Inquiry**

*One year*

*Credit: Three units core chemistry credit.*

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

This survey chemistry course includes atomic and molecular structure, chemical reactions, stoichiometry, physical properties, thermodynamics, kinetics, equilibrium, and electrochemistry. Emphasis is on developing inquiry skills required for learning science along with specific reading and writing, problem

solving, and technology applications. A review of pertinent math skills accompanies each topic as needed. The course includes a strong laboratory component that encompasses many laboratory techniques.

### **CH307a/CH307b Chemistry**

*Two trimesters*

*Credit: Two units core chemistry credit.*

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

This course provides a thorough treatment of chemical principles using a college-level textbook. It is a rigorous course that covers the fundamental concepts (atomic theory, chemical bonding, molecular structure, thermodynamics, kinetics theory, chemical equilibrium, etc.); 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).

### **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 research 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: Five 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 research project.

### **CH408 Analytical Chemistry**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of A- or higher in CH305 Chemistry by Inquiry or CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry (I) or CH405 AP Chemistry (Advanced I), or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.*

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

This course examines the analysis of compounds using different separation and purification techniques including, but not limited to thin-layer, ion-exchange, and gel-filtration chromatography as well as instrumental analysis techniques

such as gas chromatography (GC), high performance liquid chromatography (HPLC), visible and ultraviolet spectroscopy (UV-VIS), atomic absorption spectroscopy (AA) and infrared spectroscopy (IR). The laboratory component is an important part of the course and special emphasis is placed on the analysis of biochemical compounds.

### **CH410 Organic Chemistry**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of A- or higher in CH305 Chemistry by Inquiry or CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry (I) or CH405 AP Chemistry (Advanced I), or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.*

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

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

### **CH416 Environmental Chemistry**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: CH305 Chemistry by Inquiry, CH307 Chemistry, CH401 AP Chemistry (I), or CH405 AP Chemistry (Advanced I) and permission of the Dean of Science.*

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

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

### **CH418 Organic and Biochemistry**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of A- or higher in CH305 Chemistry by Inquiry or CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry (I) or CH405 AP*

*Chemistry (Advanced I), or exemption from the NCSSM core chemistry requirement, and permission of the Dean of Science.*

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

This course introduces students to the structure, synthesis, and reactions of the major organic functional groups present in biochemical compounds. Reaction mechanisms, stereochemistry, inter-and intra-molecular interactions, and reaction kinetics of biological reactions are covered with an emphasis on amino acids and protein chemistry. The laboratory involves identification of properties of biological compounds, synthetic and separation techniques, and kinetic analysis.

### **CH422 Polymer Chemistry**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of A- or higher in CH305 Chemistry by Inquiry or CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry (I) or CH405 AP Chemistry (Advanced I), or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.*

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

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

### **CH442 Research in Chemistry I**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Trimester grade of B or higher in an NCSSM chemistry course, or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.*

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

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

## **COURSE OFFERINGS: Physics**

### **Graduation Requirement in Physics**

The graduation requirement in physics may be fulfilled by one of these NCSSM physics courses or course sequences: PH307 Physics, PH355 Physics with Advanced Topics, or PH404 AP Physics C: Mechanics (I)/PH406 AP Physics C: Mechanics (II)/Electricity and Magnetism (I).

### **Placement**

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

### **PH304 Astronomy**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Four periods per week or two 90-minute evening class meetings.*

This introductory astronomy course focuses on using observations to create predictive models. Physics and chemistry concepts are introduced as needed. Topics include the sky, seasons, phases of the moon, our solar system, and the search for extrasolar planets. Students use computers extensively to analyze data and access resources. Opportunities for telescope observations are available.

### **PH307a/PH307b/PH307c Physics**

*One year*

*Credit: Three units core physics credit.*

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

This course provides an algebra-based foundation in the processes of physics, with an emphasis on qualitative and quantitative reasoning. Topics explored include mechanics, wave motion, electricity, magnetism, and modern physics. 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. Students learn content by completing real-world projects and applications.

### **PH355a/PH355b Physics with Advanced Topics**

*Two trimesters*

*Credit: Two units core physics credit.*

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

*Corequisite: MA305 Precalculus and Modeling.*

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

*NOTE: Due to significant overlap in content, qualified students may take PH355 Physics with Advanced Topics OR NCSSM Online PH424 Physics Advanced/PH426 AP Physics B, but not both.*

### **PH402 Modern Physics**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of A- or higher in PH307 Physics or final grade of B+ or higher in PH355 Physics with Advanced Topics or exemption from NCSSM core physics requirement, and permission of the Dean of Science. MA305 Precalculus and Modeling or MA355 Precalculus and Modeling with Advanced Topics.*

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

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

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

*One trimester*

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

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

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

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

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

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

*One trimester*

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

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

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

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

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

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

*One trimester*

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

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

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

This course continues the study of electromagnetism. Topics include electric circuits (R, RC, and RL), magnetism, Ampere's law, induction, and the Faraday/Lenz law. Emphasis is on the completion of the AP C Physics curriculum. Topics in geometrical and physical optics are offered after the completion of the AP syllabus. There is a strong problem-solving emphasis and the course includes a lab component. Calculus is used where needed and is

treated at a level appropriate to students who have taken MA422 AP Calculus BC (II). Completion of PH406 and this course may be used to prepare for the electricity and magnetism portion of the AP C Physics examination. The breadth and depth of this course are significantly higher than that of a typical AP C physics course.

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

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of A- or higher in PH355 Physics with Advanced Topics or permission of the Dean of Science.*

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

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

### **PH418 Astrophysics**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of B or higher in PH307 Physics or in PH355 Physics with Advanced Topics or exemption from NCSSM core physics requirement, or permission of the Dean of Science, and MA305 Precalculus and Modeling.*

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

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

### **PH420 Galaxies and Cosmology**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: PH418 Astrophysics.*

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



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

### **PH442 Research in Physics I**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: B or higher earned in one trimester of core physics at NCSSM, or exemption from NCSSM core physics requirement; and permission of the Dean of Science.*

*Meeting pattern: Eight periods per week including three labs*

This is an advanced course for students with the maturity, independence, and motivation necessary to conduct their own research project. Students learn scientific methodology and experimental design before conducting a trial experiment on a small scale. Students may then be paired into research groups to write a research proposal on a problem of interest to them. Throughout the course, students read from the primary scientific literature and participate in discussion groups on current issues in scientific research. Based on the outcomes of the trimester's work, students may be given an opportunity to participate in summer research programs on campus or in the Triangle area. Students with a final grade of B or higher are encouraged to continue in PH444 Research in Physics II.

### **PH444 Research in Physics II**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of B or higher in PH442 Research in Physics I or successful participation in a summer research program; and permission of the Dean of Science.*

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

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

### **PH446 Research in Physics III**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of B or higher in PH444 Research in Physics II, and permission of the Dean of Science.*

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

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

### **PH448 Research in Physics IV**

*One trimester*

*Credit: 1 unit core elective credit.*

*Prerequisite: Final grade of B or higher in PH446 Research in Physics III, and permission of the Dean of Science.*

*Meeting pattern: Eight periods per week including three 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.

### **PH490, PH492, AND PH494 Advanced Topics in Physics**

*One trimester each*

*Credit: One unit each core elective credit.*

*Prerequisite: Permission of the Dean of Science.*

This course offers an opportunity for students with an especially strong background in physics to pursue a rigorous course of study of a topic outside the standard curriculum. Students are expected to make frequent presentations in class. They also may be required to make formal presentations outside of class and to write a paper on the topic. The course is designed for students who have exhausted other course offerings, or whose preparation is substantially more advanced than that required of students taking a standard course.

### **CROSS-LISTED COURSES**

Courses listed below are interdisciplinary courses in more than one science subject area and/or a science subject area and an additional subject area. Full course descriptions and credit information may be found in the areas indicated.

**EE350 Introduction to Engineering – Mechanical**

Read description under Program in Applied Sciences.

**EE352 Introduction to Engineering – Electrical**

Read description under Program in Applied Sciences.

**EE454 Statics**

Read description under Program in Applied Sciences.

**EE452 Biomedical Instrumentation**

Read description under Program in Applied Sciences.

**IE306 Forensic Science**

Read description under Interdisciplinary Elective Courses.

**IE308 Explorations in Mentorship**

Read description under Interdisciplinary Elective Courses.

**IE350 Medical Ethics and Leadership**

Read description under Interdisciplinary Elective Courses.

**IE352 Environmental Ethics and Leadership**

Read description under Interdisciplinary Elective Courses.

**IE356 Engineering the Modern: The Twentieth Century American Aesthetic in its Cultural and Historical Context**

Read description under Interdisciplinary Elective Courses.

**IE370 Research Experience in Biology**

Read description under Interdisciplinary Elective Courses.

**IE372 Research Experience in Environmental Science**

Read description under Interdisciplinary Elective Courses.

**IE374 Research Experience in Applied Chemistry and Engineering**

Read description under Interdisciplinary Elective Courses.

**IE376 Research Experience in Mathematical Chemistry**

Read description under Interdisciplinary Elective Courses.

**IE378 Research Experience in Physics**

Read description under Interdisciplinary Elective Courses.

## **IE402 Introduction to Applied Chemistry and Engineering**

Read description under Interdisciplinary Elective Courses.

## **IE405 Mentorship-Senior Research**

Read description under Interdisciplinary Elective Courses.

### **PROGRAM in APPLIED SCIENCES**

The Program in Applied Sciences 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. Applied Sciences courses focus on professional areas such as architecture, business, engineering, environmental science, and medicine. They teach fundamental skills and problem-solving tools while giving students an educational experience to help inform their decisions about college majors and professions.

There are no specific requirements to take an Applied Sciences course. All of these courses do, however, fulfill part of the graduation requirement to take a number of core elective courses.

## **COMPUTER SCIENCE COURSES**

### **CS402 AP Computer Science A (I)**

*One trimester*

*Credit: One unit core elective credit.*

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

This introductory course emphasizes the design and implementation of basic computer programs. Students begin by learning the programming language Python. This is an object-oriented scripting language with very simple structure that is used to develop basic programming and problem-solving skills. Students transfer their skills to Java and learn how to write a simple Java graphical user interface (GUI) program. Students who complete this course are able to write simple programs consisting of multiple modules. It is assumed that the student has no prior programming experience.

### **CS404 AP Computer Science A (II)**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: CS400 AP Computer Science A (I): Using the WWW, CS402 AP Computer Science A (I) or permission of the Academic Programs Office.*

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

This class covers the 'A' curriculum of the AP Syllabus in Computer Science. Students build on the skills acquired in CS400 or CS402 and learn how to write object-oriented programs in Java. Students learn how to design and implement Java classes. Several programming projects of increasing complexity are assigned to build the students' skills in this area.

### **CS406 Advanced Programming**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: CS404 AP Computer Science A (II) or permission of the Academic Programs Office.*

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

This course covers inheritance, data structures, and implementing algorithms within these structures. Structures to be covered include lists, stacks, queues, heaps, and sets. Within these structures, students learn how to implement searching and sorting algorithms. Other topics include O-notation, the analysis of algorithms, and recursion.

### **CS408 Elements of Computer Systems**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: CS400 AP Computer Science A (I): Using the WWW or CS402 AP Computer Science A (I) or permission of the Academic Programs Office.*

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

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

### **CS410 Data Structures**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: CS404 AP Computer Science A (II) or permission of the Academic Programs Office.*

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

This course is a rapid review of Java syntax, one-dimensional data structures, and recursive data structures. Analysis of sorting and searching algorithms on these is included, as well as big-O analysis of computational cost. Queues, stacks, lists, and arrays are studied in detail.

### **CS412 Data Structures II**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: CS410 Data Structures I or permission of the Academic Programs Office.*

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

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

### **CS414 Data Structures III**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: CS412 Data Structures II or permission of the Academic Programs Office.*

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

This course is a practicum in advanced techniques that apply the ideas of CS400, CS402, CS404, CS410, and CS412 including such topics as web programming, databases, threads, and advanced GUI techniques. The AP case study is used throughout as a source of examples.

### **CS490, CS492, AND CS494 Advanced Computer Science Topics**

*One trimester each*

*Credit: One unit each core elective credit.*

*Prerequisite: Permission of the Academic Programs Office.*

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 COURSES**

### **EE310 Engineering Graphics**

*One trimester*

*Credit: One unit core elective credit.*

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

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

### **EE316 Introductory Robotics**

*One trimester*

*Credit: One unit core 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.

### **EE350 Introduction to Engineering – Mechanical**

*One trimester*

*Credit: One unit core elective credit.*

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

This course is designed to introduce students to the study and practice of engineering. Students explore the wide variety of fields of study in engineering, focusing on topics important to the fields of Mechanical, Civil, Chemical, and Biomedical Engineering. Using activities, design projects, and laboratory modules students learn first-hand how engineers use mathematics and science to solve problems. Topics include statics, dynamics, fluid dynamics, thermodynamics, and materials.

### **EE352 Introduction to Engineering – Electrical**

*One trimester*

*Credit: One unit core elective credit.*

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

This course is designed to introduce students to the study and practice of engineering. Students explore the wide variety of fields of study in engineering, focusing on topics important to the fields of Electrical, Electronic, Computer, and Systems Engineering. Using activities, design projects, and laboratory modules students learn first-hand how engineers use mathematics and science to solve problems. Topics include circuits, electronics, and control systems.

### **EE354 Architecture**

*One trimester*

*Credit: One unit 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.

### **EE452 Biomedical Instrumentation**

*One trimester*

*Credit: One unit core elective credit*

*Prerequisite: MA422 AP Calculus BC (II) and EE352 Introduction to Engineering-Electrical, and permission of the Academic Programs Office.*

*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 elective credit.*

*Prerequisite: MA412 AP Calculus AB (Advanced Topics II) and PH355a Physics with Advanced Topics or PH404 AP Physics C: Mechanics (I), and permission of the Academic Programs Office.*

*Meeting pattern: Four periods per week.*

In this course, students explore the principles of dynamics of particles and rigid bodies, as well as mechanics including force systems, equilibrium structures, distributed forces, centroids, and friction. Students also perform kinematic and kinetic analysis of structural and machine elements in a plane and in space in addition to absolute and relative motion analysis.

### **CROSS-LISTED COURSES**

Courses listed below are interdisciplinary courses in more than one area of applied sciences and/or an applied science area and an additional subject area. Full course descriptions and credit information may be found in the area indicated.

#### **IE308 Explorations in Mentorship**

Read description under Interdisciplinary Elective Courses.

#### **IE309 Introduction to Entrepreneurship**

Read description under Interdisciplinary Elective Courses.

#### **IE350 Medical Ethics and Leadership**

Read description under Interdisciplinary Elective Courses.

#### **IE352 Environmental Ethics and Leadership**

Read description under Interdisciplinary Elective Courses.

#### **IE354 Introduction to the Research Experience**

*Read description under Interdisciplinary Elective Courses.*

#### **IE356 Engineering the Modern: The Twentieth Century American Aesthetic in its Cultural and Historical Context**

Read description under Interdisciplinary Elective Courses.

**IE364 Completion of the Research Experience**

Read description under Interdisciplinary Elective Courses.

**IE370 Research Experience in Biology**

Read description under Interdisciplinary Elective Courses.

**IE372 Research Experience in Environmental Science**

Read description under Interdisciplinary Elective Courses.

**IE374 Research Experience in Applied Chemistry and Engineering**

Read description under Interdisciplinary Elective Courses.

**IE376 Research Experience in Mathematical Chemistry**

Read description under Interdisciplinary Elective Courses.

**IE378 Research Experience in Physics**

Read description under Interdisciplinary Elective Courses.

**IE405 Mentorship-Senior Research**

Read description under Interdisciplinary Elective Courses.

**IE450 Applications in Entrepreneurship**

Read description under Interdisciplinary Elective Courses.

**Interdisciplinary Elective Courses**

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

**IE306 Forensic Science**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Completion of one course in either biology or chemistry, concurrent enrollment in the other and completion of algebra.*

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

This one trimester course is designed to give NCSSM students an introduction and broad overview of forensic science. This course focuses on crime scene investigation, including evidence collection, processing a scene, and lab techniques used to decipher and incriminate the wrongdoer. Through lab work, field trips, demonstrations by experts, and guest speakers, students explore major areas of forensic science: fingerprinting, blood typing, shoe and tire impressions,

identification of hair, fibers and glass fragments, DNA; application of force and motion from blood splatters and tire skids; and forensic anthropology (the study of bone structures and features).

### **IE308 Explorations in Mentorship**

*One trimester*

*Credit: One unit additional elective credit.*

*Prerequisite: Third-trimester junior intending to register for IE405 Mentorship-Senior Research in senior year and selection by the Mentorship Coordinator based on Mentorship Application process.*

*Meeting pattern: Two periods per week.*

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

### **IE309a/IE309b Introduction to Entrepreneurship**

*Two trimesters*

*Credit: Two units core elective credit.*

*Prerequisite: Permission of the Academic Programs Office.*

*Meeting pattern: One 2-hour evening class meeting.*

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

### **IE310 World Music**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Three periods per week.*

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

### **IE312 History of Western Music**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Three periods per week.*

This course is a chronological survey of Western music focusing primarily on the Baroque, Viennese, and Romantic eras of Western music history. Students use music and listening as a vehicle to understanding theoretical and historical trends of each stylistic period. Stylistic and composer overviews of the eras serve as a conceptual focus for the music that follows in each historical period.

### **IE314 American Popular Song**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Three periods per week.*

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

### **IE316 Twentieth-Century Music History**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Three periods per week.*

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. Stylistic and composer overviews serve as a conceptual focus for the music that follows in each historical period.

### **IE318 Shakespeare in Performance**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Three periods per week.*

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

### **IE320 Science, Math, and Theater**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting pattern: Three periods per week.*

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

### **IE350 Medical Ethics and Leadership**

*One trimester*

*Credit: One unit core elective credit.*

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

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

### **IE352 Environmental Ethics and Leadership**

*One trimester*

*Credit: One unit core elective credit.*

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

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

### **IE354 Introduction to the Research Experience**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Third-trimester junior.*

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

This introductory course is for junior students, with little experience in research, who wish to pursue a research opportunity in computer science or the humanities. Participants learn basic research skills in methodology, research design, and literature review. By the conclusion of the course, students have identified a research question and written a research proposal which will be implemented and completed in IE364 Completion of the Research Experience during the first or second trimester of their senior year.

### **IE356 Engineering the Modern: The Twentieth-Century American Aesthetic in its Cultural and Historical Context**

*One trimester*

*Credit: One unit core elective credit.*

*Meeting Pattern: Four periods per week.*

This interdisciplinary course examines the aesthetic and scientific transformations of the late nineteenth and twentieth centuries that resulted in High Modernism, primarily in an American historical and cultural context but including European backgrounds and influences. Influences between the visual arts, architecture, literature, engineering, science, and technology are examined against the background of historical and political movements and events in order to

construct a comprehensive understanding of this historical period and its lasting significance. The cultural significance of topics such as the Brooklyn Bridge, Frank Lloyd Wright, Albert Einstein, the Arts and Crafts movement, the birth of the skyscraper, automation, the atomic age, the digital age, and Postmodernism show the relationship between diverse modes of expression and demonstrate how innovations in science and technology affect the ways reality is perceived and depicted. Assessments for the course are essay-based and project-based and are designed to allow students to develop and demonstrate their analytical reasoning critical thinking skills and ability to communicate ideas in multiple modes of discourse.

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

*One trimester*

*Credit: One unit core elective credit.*

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

What is awareness? How is dreaming different from ordinary awareness? What does mathematics have to do with awareness? Are different kinds of awareness related? In this course, students explore these and other questions as they engage in a seminar-style study of what is commonly spoken of as “mind, soul, spirit, or consciousness” – not as a biochemical product or metaphysical construct but rather as experienced in the moments of lived time. Through reading, reflection, class discussion, and writing short papers, students develop an understanding of awareness as it is lived now in moments of a transfinite continuum. Readings include *The Phenomena of Awareness: Husserl, Cantor, Jung* by C. Tougas (Routledge: 2012) and selections from Plato, Aristotle, Saint Augustine, Immanuel Kant, Søren Kierkegaard, Edmund Husserl, Edith Stein, Albert Camus, Georg Cantor, and C. G. Jung.

### **IE360 Global Understanding**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Completion of at least two trimesters of AS303 Writing and American Studies or AS305 American Studies.*

*Meeting Pattern:* Four periods per week including lab. Since meetings of this course must be coordinated with schools in other countries, the meeting pattern may include one or more weekly evening class meetings, to be announced prior to registration.

In this course, designed to bring a global experience to NCSSM students, we develop and foster cross-cultural understanding in partnership with students in other parts of the world. Through a shared virtual classroom, we explore our cultural differences and similarities in dialogue with students and faculty at schools in countries other than the United States. We engage in discussions

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

### **IE364 Completion of the Research Experience**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: First-trimester or second-trimester senior and completion of IE354 Introduction to the Research Experience.*

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

In this course senior students who have completed IE354 Introduction to the Research Experience implement the research project in computer science or the humanities that they proposed the previous year. Participants collect and appropriately analyze data, then write a final paper describing their research. Students also make a formal oral and visual presentation of their findings.

### **IE370 Research Experience in Biology**

*One trimester*

*Credit: One unit core elective credit.*

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

This introductory course is for students, with little previous experience, who want to pursue a research opportunity in science. 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 science articles. The second portion of the course is devoted to working in small groups on a research project. Research questions may be selected from areas identified by the instructor related to microbiology, DNA research, enzyme



studies, food science, toxicology, 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.

### **IE372 Research Experience in Environmental Science**

*One trimester*

*Credit: One unit core elective credit.*

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

This introductory course is for students, with little previous experience, who want to pursue a research opportunity in science. 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 science articles. The second portion of the course is devoted to working in small groups on a research project. Research questions may be selected from areas identified by the instructor related to 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.

### **IE374 Research Experience in Applied Chemistry and Engineering**

*One trimester*

*Credit: One unit core elective credit.*

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

This introductory course is for students, with little previous experience, who want to pursue a research opportunity in science. 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 science articles. The second portion of the course is devoted to working in small groups on a research project. This course addresses chemical and chemical engineering research in the private sector. Research questions may be selected from areas identified by the instructor related to the product development process and industrial production of aspirin or soap, or from topics proposed by the student, if appropriate within the context of economics and product marketing. Students then write a final paper describing their research and make a formal oral and visual presentation of their findings.

### **IE376 Research Experience in Mathematical Chemistry**

*One trimester*

*Credit: One unit core elective credit.*

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

This introductory course is for students, with little previous experience, who want to pursue a research opportunity in science. 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 science articles. The second portion of the course is devoted to working in small groups on a research project. Research questions may be selected from areas identified by the instructor related to the use of a variety of mathematical methods (numerical methods) in the study of interesting chemical problems or from mathematical chemistry 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.

### **IE378 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, with little previous experience, who want to pursue a research opportunity in science. 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 science articles. The second portion of the course is devoted to working in small groups on a research project. Research questions may be selected from areas identified by the instructor related to sports science, biomechanics, video analysis of different motion types, projectile motion, 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.

### **IE402 Introduction to Applied Chemistry and Engineering**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of A- or higher in CH305 Chemistry by Inquiry, CH307 Chemistry, or final grade of B or higher in CH401 AP Chemistry ( I), or exemption from NCSSM core chemistry requirement, and permission of the Dean of Science.*

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

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

### **IE405a/IE405b Mentorship-Senior Research**

*Two trimesters*

*Credit: Two units core elective credit.*

*Prerequisite: Senior standing, completion of IE308 Mentorship Explorations with a grade of A- or higher, and permission of the Academic Programs Office.*

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

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

### **IE406 Mentorship – Extended Research**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Completion of IE405 Mentorship-Senior Research and permission of the Vice Chancellor for Academic Programs.*

*Meeting Pattern: Seven periods per week including two labs.*

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

### **IE442 Research in Computational Science I**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Second-trimester junior standing or senior standing, and permission of the Dean of Science.*

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

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

### **IE444 Research in Computational Science II**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of B or higher in IE442 Research in Computational Science I or successful participation in a summer research program, and permission of the Dean of Science.*

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

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

### **IE446 Research in Computational Science III**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of B or higher in IE444 Research in Computational Science II and permission of the Dean of Science.*

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

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

#### **IE448 Research in Computational Science IV**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Final grade of B or higher in IE446 Research in Computational Science III and permission of the Dean of Science.*

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

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

#### **IE450 Applications in Entrepreneurship**

*One trimester*

*Credit: One unit core elective credit.*

*Prerequisite: Selection by the proposal evaluation committee.*

*Meeting pattern: One 2-hour evening class meeting.*

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

### **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. Residential students who are approved to use an NCSSM Online course to meet a core subject graduation requirement are permitted to

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

#### **BI430 Environmental Science Advanced**

*One Semester*

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

*Prerequisite: Permission of the Vice Chancellor for Academic Programs.*

*Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.*

This is the first semester of a two-semester sequence to prepare students to take the AP Environmental Science examination. The curriculum includes a survey of key environmental science topics, laboratory and field methods. Topics include earth systems, including the climate, the atmosphere, the oceans, forests, ecology, ecosystems and the lithosphere. When followed by BI432 AP Environmental Science this course helps to prepare students for the Advanced Placement examination in Environmental Science. More information: <http://online.ncssm.edu/courses>.

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

### **BI432 AP Environmental Science**

*One Semester*

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

*Prerequisite: BI430 Environmental Science Advanced and permission of the Vice Chancellor for Academic Programs.*

*Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.*

This course surveys key environmental science topics, laboratory and field methods with a strong focus on human impacts on earth systems and policy approaches moderate those impacts. When taken following successful completion of BI430 Environmental Science Advanced, this course helps to prepare students for the Advanced Placement examination in Environmental Science. More information: <http://online.ncssm.edu/courses>.

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

### **CH412 Introduction to Computational Chemistry**

*One Semester*

*Credit: One unit core 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.*

Students learn specific techniques for studying chemistry computationally using specialized technologies and tools that enable them to develop an

understanding about the basic concepts used by computational chemists, as well as different types of software. NCSSM is one of a limited number of high schools in the country that offers computational chemistry. More information: <http://online.ncssm.edu/courses>.

### **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.*

This course provides a problem-based, basic understanding of pharmacology and protein biology. Students learn how drugs are designed and developed, and about the role that genetics plays in modern pharmacology. Students work collaboratively in small teams to solve a medicinal chemistry “case study”. This course makes significant use of computer modeling (computational chemistry). More information: <http://online.ncssm.edu/courses>.

### **CH424 Chemistry Advanced**

*One Semester*

*Credit: One unit core chemistry credit.*

*Prerequisite: Completion of an honors chemistry course with a final grade of B or higher and permission of the Vice Chancellor for Academic Programs.*

*Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.*

This is the first semester of a two-semester sequence to prepare students to take the AP Chemistry examination. It is a fast-paced, rigorous chemistry course which provides an advanced, in-depth review of selected general chemistry topics. This course covers fundamental and advanced concepts of chemistry and uses a college-level textbook. When followed by CH426 AP Chemistry, this course helps to prepare students for the Advanced Placement examination in Chemistry. More information: <http://online.ncssm.edu/courses>.

### **CH426 AP Chemistry**

*One Semester*

*Credit: One unit core chemistry credit.*

*Prerequisite: Completion of CH424 Chemistry Advanced with a final grade of B or higher and permission of the Vice Chancellor for Academic Programs.*

*Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.*



This is a fast paced, rigorous chemistry course which, when taken following successful completion of CH424 Chemistry Advanced, helps to prepare students for the Advanced Placement examination in Chemistry. More information: <http://online.ncssm.edu/courses>.

### **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.*

A writing course focused through the specific lens of ecocriticism while learning the literary conventions, structures, and elements necessary to evaluate any piece of prose, we focus on how authors have addressed the physicality of the natural world including the way we encounter and describe the “otherness” of nature, the evolution of our understanding of our environment, and the effect of that development on our understanding of ourselves, the issues resulting in irresponsible interactions with the environment, and how these global ideas manifest themselves in local and individual behaviors. More information: <http://online.ncssm.edu/courses>.

### **IE380 Bioinformatics (Computational Biology)**

*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.*

Computational biology – known also as “bioinformatics” – is a hybrid, interdisciplinary course, and is one of the most important new fields of study in science. Computational biology is not a biology course pre se – it is the application of computing and mathematics (primarily statistics) to biological data. What is biological data? Mostly genetics and genomics data, such as studies of DNA extracted from mice breeding experiments to predict the genetic basis of diseases such as cancer, high blood pressure, and obesity. Successful completion of this course can open opportunities for research at the undergraduate level and beyond. More information: <http://online.ncssm.edu/courses>.

## **IE404 Green Environmental Geology**

*One Semester*

*Credit: One unit core elective credit.*

*Prerequisite: Permission of the Vice Chancellor for Academic Programs.*

*Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.*

This course explores the earth science behind environmentalism, while reinforcing basic concepts of geology. Students examine the human impact on earth and how earth affects humans. Topics include the science and politics, climate change, waste disposal, natural hazards, earthquakes, etc. The class focuses on the geologic principles behind many AP Environmental Science topics. More information: <http://online.ncssm.edu/courses>.

## **PH424 Physics Advanced**

*One Semester*

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

*Prerequisite: Completion of a precalculus course and an introductory chemistry or physics course and permission of the Vice Chancellor for Academic Programs.*

*Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.*

This is the first semester of a two-semester sequence to prepare students to take the AP Physics B examination and is intended for students interested in studying physics as part of the basis for more advanced work in college in the life sciences, medicine, geology, or related areas. This course covers the topics of kinematics, Newtonian mechanics, energy and momentum, rotation, gravitation, simple harmonic motion, and fluid statics. Instruction is at a rapid pace and students should expect to spend 15 hours per week in study. The course focuses on developing conceptual understanding and problem-solving and laboratory skills. There is a hands-on laboratory component that emphasizes methods of measurement, analysis, and modeling. Each student receives a loaner lab kit, but students may also have to borrow some items of equipment from their local science department. More information: <http://online.ncssm.edu/courses>.

## **PH426 AP Physics B**

*One Semester*

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

*Prerequisite: Completion of PH424 Physics Advanced with a final grade of B or higher and permission of the Vice Chancellor for Academic Programs.*

*Meeting pattern: Online, plus weekly scheduled webinar, and select on-campus all day Saturday sessions.*

This is the second semester of a two-semester sequence to prepare students to take the AP Physics B examination. Topics covered include electricity and magnetism, waves and optics, atomic and nuclear physics, and relativity. Instruction is at a rapid pace and students should expect to spend 15 hours per week in study. The course focuses on developing conceptual understanding and problem-solving and laboratory skills. There is a hands-on laboratory component that emphasizes methods of measurement, analysis, and modeling. Each student receives a loaner lab kit, but students may also have to borrow some items of equipment from their local science department. More information: <http://online.ncssm.edu/courses>.

*NOTE: Due to significant overlap in content, qualified students may take NCSSM Online PH424 Physics Advanced/PH426 AP Physics B OR PH355 Physics with Advanced Topics but not both.*

### **SS416 Science Catastrophe and Culture**

*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.*

Science, Catastrophe and Culture is an interdisciplinary cultural studies course which looks at the history and philosophy of science. We explore not only discoveries and catastrophes, but the way that our modes of thought have affected scientific discovery and how scientific discovery has affected our modes of thought. More information: <http://online.ncssm.edu/courses>.

### **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 PA100 Varsity Sports or another activity-based PA course. PA160/PA162 Sports Medicine I/II 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 PA100 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 PA100 Varsity Sports only once unless satisfying a documented entering credit deficiency in physical activity.

### **PA100 Varsity Sports**

*One trimester*

*Credit: One unit physical activity credit.*

*Prerequisite: Prior junior varsity or varsity experience in the sport of choice, selection by the NCSSM coach to the varsity sport team through normal team-selection procedures.*

*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.*

This course is 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 9<sup>th</sup>/10<sup>th</sup> 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 PA100 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 PA100 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 credit for

PA100 Varsity Sports only once unless satisfying an entering credit deficiency in physical activity.

### **PA104 – PA126 Individual and Team Sports**

*One trimester each*

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

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

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

PA104 Archery

PA106 Flag Football

PA108 Ultimate Frisbee

PA110 Soccer

PA112 Tennis

PA114 Basketball

PA118 Racquetball

PA120 Volleyball

PA122 Lacrosse

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 designed for those who are serious about getting in shape. 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 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 Aerobics**

*One trimester*

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

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

This course is designed to develop cardio-respiratory fitness, muscle strength, muscle endurance, and flexibility through the use of various modes of exercise. Students develop an overall knowledge of cardio-respiratory fitness and learn to identify the major muscles of the human body. No previous experience with aerobics 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.

### **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 designed 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 in any order. One is not prerequisite for the other.

### **PA136 Introduction to Dance Composition**

*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 theories of dance composition. Students learn to choreograph solos, duets, trios, and group dances using the elements of dance: body, effort, shape, space. Each class consists of a modern dance technique class. Through daily active dance participation, students learn to use improvisation as a tool to create new movement, as well as body awareness, use of the environment, and group dynamics. No previous dance experience is necessary for this course. The completed and work-in-progress dances are shown in either a studio performance or an informal dance showing. 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 and choreography. 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 ballet, modern, jazz, and hip hop. This course familiarizes the student with practices, philosophies, terminologies, styles of dance, and careers in dance. Lectures include films and recordings. 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 is designed to introduce 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 Resistance Training**

*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, theories, and concepts in resistive training. Emphasis is on utilizing proper form with each exercise involving weights to safely obtain increased muscle tone, endurance, strength, or power. Through active participation, students are able to design and execute an individualized exercise program to meet their 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 Modern /Jazz Dance**

*One trimester*

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

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

This course focuses on the contemporary dance techniques of Modern and Jazz dance, emphasizing correct alignment and the development of strength and flexibility to support efficient, expressive movement. Modern dance is associated with full-body engagement and a strong center, while Jazz dance features syncopated rhythms and body part isolations. Class work also focuses on musicality and stylistic considerations in the performance of dynamic movement combinations. No previous experience in dance 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.

### **PA146 Pilates and Yoga I**

*One trimester*

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

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

Students learn the fundamentals of the Pilates method of exercise, along with basic Yoga movements and poses. Both systems of movement emphasize the



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

### **PA148 Social and Folk Dance**

*One trimester*

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

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

Students learn a selection of dances that are typically performed in social situations. Dances are drawn from a variety of forms such as ballroom, Latin, line dance, and international folk dance. Emphasis is on energetic dances that help develop coordination and rhythmic skills. Class work includes a full body warm up and contextual information about the dance forms. No previous experience with dance 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.

### **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 designed for students who are interested in performing in our annual spring dance concert. 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 designed for students interested in ballet. Students learn coordination, musicality, and strength as well as ballet 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 designed for students with at least five years of dance experience and is a continuation of PA134 Advanced Dance Techniques I, although PA134 is not prerequisite for this one. 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 in any order. One is not prerequisite for the other.

### **PA156 Pilates and Yoga II**

*One trimester*

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

*Prerequisite: PA146 Pilates and Yoga I.*

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

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

### **PA158 Couch to 5K**

*One trimester*

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

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

This course is designed for students who are ready to get in shape. The focus is on cardio strength as well as overall body toning. 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 Sports Medicine I**

*One trimester*

*Credit: One unit additional elective credit.*

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

This course is designed to introduce the field of athletic training to the high school student. Topics of study include basic anatomy/physiology, athletic training skills, and the recognition, management, and rehabilitation of common athletic injuries.

### **PA162 Sports Medicine II**

*One trimester*

*Credit: One unit additional elective credit.*

*Prerequisite: PA160 Sports Medicine I.*

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

This course is a continuation of PA160 Sports Medicine I and is designed for 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.

### **Graduation Requirement in Student Life**

All students must meet the SSL105 Summer Service Learning requirements before the start of their senior year at NCSSM. All junior students are required to successfully complete SL101 Junior Student Life Curriculum and senior students must successfully complete SL201 Senior Student Life Curriculum. Also, all students must successfully complete two years of WS105 Work Service. These courses are all graded Satisfactory/ Unsatisfactory (S/U) and do not compute in the GPA.

### **SSL105 Summer Service Learning**

*Credit: Service Learning graduation credit.*

*60 hours in summer between junior and senior year or in summer prior to first enrollment at NCSSM.*

This experience introduces students to service learning. Students work for a non-profit organization in their home community. Students maintain a daily journal of

their experiences, interview staff members of the organization, and share with other members of the NCSSM community in a small group reflection session based on their experiences.

### **SL101a/SL101b Junior Student Life Curriculum**

*Two trimesters*

*Credit: Junior student life graduation credit.*

*Prerequisite: Junior standing.*

*Meeting pattern: One period per week.*

Student Life 101 is the curricular component of the holistic education provided at NCSSM through the Student Life Division. The curriculum utilizes the residential goals as outlined in the School's Mission Statement. SL101 offers junior students a carefully structured orientation to NCSSM, an introduction to academic and personal success strategies, and an opportunity for self-discovery and self-realization. Topics include: transition to NCSSM, time management and study skills, harassment, diversity, drugs and alcohol, sex education, and interview skills.

### **SL201a/SL201b/SL201c Senior Student Life Curriculum**

*Three trimesters*

*Credit: Senior student life graduation credit.*

*Prerequisite: Senior standing.*

*Meeting pattern: Periodically, as announced.*

Student Life 201 is the curricular component of the holistic education provided at NCSSM through the Student Life Division. The curriculum utilizes the residential goals as outlined in the School's Mission Statement. Throughout the year, senior students attend sessions on various topics: college planning, summer reading discussions, drugs and alcohol, career planning with alumni, and other holistic topics.

### **WS105a/WS105b/WS105c Work Service**

*Three trimesters each year*

*Credit: Work service graduation credit.*

*Meeting pattern: Three hours per week.*

Students are introduced to professional work expectations while assisting NCSSM departments three hours per week. Students are trained in the specific functions of their assigned area. Students receive opportunity for constructive evaluation and mentoring.

## **STUDY OPTIONS and SPECIAL PROGRAMS**

### **Individualized Study**

Credit: Same as established for the regular course.

Grading: A, B, C, D or S, U as established in the regular course.

*Prerequisite: Approval by the instructor of the course, Academic Dean, Advisor and Vice Chancellor for Academic Programs.*

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

### **Independent Study**

Credit: ½ unit of non-core elective credit.

Grading: A, B, C, D or S, U as established at time of registration.

*Prerequisite: Approval of sponsoring member of the faculty, Academic Dean, Advisor and Vice Chancellor for Academic Programs.*

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

### **Seminar**

Credit: ½ unit of non-core elective credit.

Grading: A, B, C, D or S, U as established at time of registration.

*Prerequisite: Approval of sponsoring member of the faculty, Academic Dean, Advisor and Vice Chancellor for Academic Programs.*

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

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

## Graduation Requirements and Exemptions

Core Subject	Credits Earned at Previous School	Minimum Trimester Credits Required at NCSSM	Notes
English	2	4	
Mathematics	2	5	Students must complete precalculus or higher math. Students who enroll in algebra need to complete six trimester credits.
Science	1	6	Students need to complete two trimester credits each in biology, chemistry, and physics. At least three must be completed in the junior year.
History/Social Science	1	2	
World Languages	0	6	Juniors enrolling in intermediate or higher level need only complete three trimester credits.
Physical Activity & Wellness	1	1	
Core Electives	1	Varies*	Students are required to complete enough core elective trimester credits to meet their total core requirement.
<b>Total</b>			Minimum core trimester credits (excluding additional elective courses and special study options) required at NCSSM = 27
Student Life			Final evaluation of "S" (Satisfactory) in each course.
Work Service			Final evaluation of "S" (Satisfactory) in both junior and senior years
Summer Service Learning			Final evaluation of "S" (Satisfactory) in both junior and senior years
Mini-Term			Final evaluation of "S" (Satisfactory) in both junior and senior years

### Exemption Criteria

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

#### **AS305 American Studies Exemption Guidelines**

Incoming junior students with an AP score of 4 or higher on the AP English Literature exam OR the AP English Language exam AND on the AP U.S. History exam, may exempt the American Studies requirement by submitting a copy of their AP score reports to the Registrar. Students who exempt American Studies must complete four units of core English credit and at least two units of history/social science credit.

#### **World Language Exemption Guidelines**

Students may exempt the World Language requirement only in languages that are taught at NCSSM: Chinese, French, Japanese, Latin, and Spanish. Incoming junior students who wish to exempt must demonstrate proficiency in one of

those languages either through the appropriate NCSSM exemption exam or by submitting an AP score of 4 or 5 in that language.

Students who exempt the World Language requirement are not required to take additional language courses at NCSSM. However, since many colleges and universities require at least two years of formal instruction in a world language, students who have not had such instruction are encouraged to complete that instruction at NCSSM as part of their elective course choices.

### **Science Exemption Guidelines**

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

### **Biology Exemption Guidelines**

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

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

### **Chemistry Exemption Guidelines**

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

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

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

## **Physics Exemption Guidelines**

### **AP B PHYSICS**

Students with a score of 4 or 5 on the AP B Physics examination AND demonstrated competence in fundamental laboratory skills may exempt the NCSSM physics graduation requirement by submitting a copy of their AP score report and sitting for the laboratory examination administered during Orientation in August. The student may exempt the requirement by scoring above a cutoff established for exemption.

Students who provide evidence of laboratory competence in their laboratory notebook from a previous physics course may be excused from the laboratory part of the examination.

### **AP C PHYSICS**

Students with a score of 4 or 5 on BOTH the AP C Physics Mechanics and the AP C Physics Electromagnetism examinations AND demonstrated competence in fundamental laboratory skills may exempt the NCSSM physics graduation requirement by submitting a copy of their AP score report and sitting for the laboratory examination administered during Orientation in August. The student may exempt the requirement by scoring above a cutoff established for exemption.

Students with a score of 4 or 5 on just the AP C Physics Mechanics examination *and* demonstrated competence in fundamental laboratory skills may be approved for a modified exemption of the NCSSM physics graduation requirement. Such students meet the NCSSM graduation requirement in physics by completing PH406 AP C: Mechanics (II)/Electricity and Magnetism (I).

Students who provide evidence of laboratory competence in their laboratory notebook from a previous physics course may be excused from the laboratory part of the examination.

### **NO AP SCORE**

Students who have not taken these physics AP examinations, but who believe their mastery of the subject may qualify them for exemption may sit for the NCSSM physics exemption/placement examination and for the physics laboratory examination given during Orientation in August. Students may exempt the requirement by scoring above a cutoff established for exemption.

Students who provide evidence of laboratory competence in their laboratory notebook from a previous physics course may be excused from the laboratory part of the examination.



Students who do not score above the cutoff established for exemption, but whose score indicates readiness for advanced study in physics, may be approved by the Dean of Science to fulfill the NCSSM physics graduation requirement by completing both PH404 AP Physics C: Mechanics (I) and PH406 AP Physics C: Mechanics (II)/Electricity and Magnetism (I). Such students may be required to complete some or all of the physics laboratory requirements in PH355 Physics with Advanced Topics.

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*\*As of April 25, 2012*

## ADDENDUM

**Added July 2012:**

**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 are able to converse comfortably in Mandarin in more extended and complex ways: they are able not only to describe and narrate but also to compare and contrast, as well as to persuade. Students enrolling in this course are expected to have full mastery of pinyin and stroke order, and recognition of approximately 60 radicals and 500 characters. Students expand their spoken vocabulary, develop more complex structures in their speech, are exposed to a variety of accents and registers of speech, increase their knowledge and use of formal language, and improve their ability in written language production. They also learn the basics of Classical Chinese. Students continue to observe and compare cultural differences to improve effective cross-cultural communication. Textbook activities are supplemented by readings in authentic materials, including newspaper articles. The course is proficiency-based, and class is conducted entirely in Chinese.

**ADDED September 2012**

**EN366 Introduction to Poetry Writing**

One trimester

*Credit: One unit core elective credit.*

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

Successful poems are not unlike complex, functioning machines: they are things built, like an automobile, of pieces and parts, each serving some vital function, each assembled with sweat and no small effort on the part of the poet. This course is designed to help students design and build those beautiful machines made of language. Students read as writers, paying attention to meaning but paying more attention to how the poet arrives at his/her meaning through careful deployment of the elements of craft. In workshop-style classes, students present their own drafts and analyze drafts written by their peers. While a textbook helps guide students through some basic concepts, each student develops his/her own reading list in consultation with the course instructor. The course culminates with the creation of a short book.