SHENANDOAH VALLEY
GOVERNOR'S SCHOOL

SVGS Course Guide 2025-2026

Shenandoah Valley Governor's School serves approximately 225 talented 11th and 12th grade students from Augusta County, Staunton and Waynesboro. Twelve full-time and numerous part-time adjunct instructors work with the students.

SVGS provides a supportive and challenging environment for local gifted and talented students to nurture and develop their talents, expand their knowledge, improve critical thinking skills, and foster their sense of personal and social responsibility. Students choose one of two parallel programs, Sciences (science, technology, engineering, and math) or Arts and Humanities.

The ***Arts (Arts & Humanities) program*** focuses on broader contexts and an integrated experience using arts and humanities 1) to develop skills in critical thinking and communication, 2) to engage students in creative thought, and 3) to understand the value of human expression for individuals and societies.

Arts & Humanities students are required to take 1) one class in English; 2) one credit each from the following areas: *human experience, human communication and cultural appreciation*; and 3) two elective choices from those areas. These areas provide students interested in arts & humanities an intensive program to develop their skills. The program is designed to provide student choice and flexibility so they may best match their interests and talents with program offerings.

The ***Sciences (STEM) program*** emphasizes "practical and professional" experiences. Courses in the sciences program are based on problem solving, analysis, and application with a minimum of rote exercise. Technology is embedded heavily in all courses. Professional experiences are emphasized throughout the program.

Sciences students are required to complete three (3) credits in their first year, one in each of the core areas. Returning seniors complete four credits in the core areas.

SVGS has identified nine skills as critical to life-long learning and performance in any academic discipline and profession. These skills are cultivated through exceptional learning experiences at SVGS and are listed below:

- ✓ Intellectual Curiosity
- ✓ Intellectual Independence
- ✓ Persistence and Perseverance
- ✓ Critical Analysis and Reflection
- ✓ Problem Solving
- ✓ Leadership and Collaboration
- ✓ Communication
- ✓ Digital Literacy
- ✓ Social and Ethical Responsibility

SVGS students are selected through a competitive admissions process based on multiple criteria such as academic performance, talent, interests, and teacher recommendations. Admission is offered to approximately 65% of all applicants.

Students apply during their sophomore or junior year. Applications are available through high school counselors and on the SVGS web page December 1 of each year. Applications due on February 20.

All SVGS classes are year-long classes and are taught at an advanced/college level. SVGS classes are designated as "GS" on the student's official high school transcript and are weighted one quality point in the student's cumulative GPA at their base school. Senior Capstone Mentorship is not weighted.

ARTS & HUMANITIES

*Arts & Humanities first-year students are required to take one class in English and two elective choices from the following areas: human experience, human communication and cultural appreciation. Second-year students take four classes including one class in English and three elective choices based on their interests. All second-year students must take at least one capstone fulfillment course. These courses have project-based curriculum.

Critical Analysis and Writing

Literature, Composition and Ideas I* **DEGENG111 & DEGENG112**
Grade 11 **1 English credit**
Pre-requisite: None
Humanities I introduces students to the rigors of college-level academic writing and critical thinking. In the fall, students explore essential texts centered on timely issues such as education, language, gender and society, and ethics and morality. Class discussions form the cornerstone of exploring ideas and give students the opportunity to share insights and to appreciate others' perspectives. Students then generate their own essay topics and take those topics through the writing process: drafting, peer editing, conferencing with the teacher, rethinking, and revising. Later in the year, students transition to the course's literary focus with texts that reflect the emergence and evolution of the American Dream. These works help students understand the unique qualities of the American spirit and its relevance today. As part of the course, students gain experience in working with literary criticism to develop their growing understanding of what it means to make thoughtful assertions about texts and to be able to support those assertions. Essays require students to incorporate criticism as a means of supporting their own original observations. **This class has two state required end-of-course Standards of Learning tests: Reading and Writing.**

Blue Ridge Community College dual-enrollment credit available at student's own expense (ENG 111 & ENG 112, 3 credits each, total 6 credits).

Literature, Composition and Ideas II* **DEGHUM111**
Grade 12 **1 English credit**
Pre-requisite: None
Humanities II builds on the composition and critical thinking skills students have established in Humanities I. Course content is focused on having students explore monsters and the literary imagination—the connection between monsters and the societies which create and perpetuate them. Texts reflect the chronological evolution of monsters, from Grendel in Beowulf to the zombie apocalypse in World War Z, and invite students to consider the psychological and cultural implications of monstrosity on society. Students continue to explore literary criticism as a means of supporting their original approaches to essays with an emphasis on seeking and using relevant digital sources effectively.

Blue Ridge Community College dual-enrollment credit available at student's own expense (HUM 111, 3 credits).

Human Experience

AP Psychology* **SST253**
Grade 11 **1 Elective credit**
Pre-requisite: None
AP Psychology introduces students to the scientific study of how we think, feel, and act. By studying the concepts and results of landmark psychological research, students will learn the major concepts, theories, and history of understanding human behavior and mental processes. Students will learn the methods, both historical and current, that psychologists use to find the answers to questions about brain function, behavior, perception, motivation, cognition, learning, development, personality, social influences, and mental health. Students will learn to think critically about psychological evidence, to evaluate its validity, and to apply its relevance to important issues in their own ~~life~~ lives. Students will develop insight into their own and others' behavior and mental processes and will apply effective strategies for self-management and self-improvement.

Students take this class as part of the Advanced Placement Program (AP) at their own expense.

Developmental Psychology*

DEPSY230

Grade 11, 12 **1 Elective credit**

Pre-requisite: None

Students will be introduced to the development of the individual from conception to death. The course follows a life-span perspective on the development of a person's physical, cognitive, psychological, and social growth. Topics include the individual's emotional, perceptual, and intellectual development as well as the development of language, personality, and social interactions. Critical debates such as the relative importance of nature vs nurture, stability vs change, continuity vs discontinuity, and the impact of sensitive or critical periods will be addressed throughout the course.

Blue Ridge Community College dual-enrollment credit available at student's own expense (PSYC 230, 3 credits).

Scientific Research in Social Science*

SCI212SS ***Capstone Fulfillment Course**

Grade 12 **1 Elective credit**

Pre-requisite or Co-requisite: SVGS Psychology or a 3 or higher on AP Psychology exam; or permission of director.

Students will work with a social science mentor to discover and put into practice various research methods in the social sciences. They will collect both qualitative and quantitative data, adhering to all ethical guidelines and procedures established for working with human participants. Students will make use of on-line libraries and scholarly scientific resources in order to complete an individual research project, write a scientific paper, and submit their results for presentation at various venues. Participation at the SVGS Research Symposium is required, as may be entry in local or regional science fairs and paper submission to student research journals for publication.

This course DOES NOT count as a lab science credit as required by the VDOE Graduation Credit Requirements.

Sociology of the Family*

DESOC200 & DESOC215

Grade 12 **1 Elective credit**

Pre-requisite: None

The College-Level Sociology course is designed to introduce students to the sociological study of society. Sociology focuses on the systematic understanding of social interaction, social organization, social institutions, and social change. Major themes in sociological thinking include the interplay between the individual and society, how society is both stable and changing, the causes and consequences of social inequality, and the social construction of human life. Understanding sociology helps discover and explain social patterns and see how such patterns change over time and in different settings. By making vivid the social basis of everyday life, sociology also develops critical thinking by revealing the social structures and processes that shape diverse forms of human life. A two-semester, continuous course in which you have the opportunity to acquire skills and explore the fundamentals of social life, significant research and theory in areas such as culture, social structure, socialization, deviance, social stratification, and social institutions.

Blue Ridge Community College dual-enrollment credit available at student's own expense *(SOC 200 & SOC 215, 3 credits each, total 6 credits).*

Teachers for Tomorrow I

GSDEEDU200 ***Capstone Fulfillment Course**

Grade 11, 12 **1 Elective credit**

GO2TEACH is a 2 year-program which combines opportunities at VCTC in the Teachers for Tomorrow program with opportunities in the Arts & Humanities program at SVGS. Students in this program would take Teachers for Tomorrow as an elective class in the SVGS Arts & Humanities program to receive extensive training and practicum experience in exploring the teaching profession.

INDUSTRY CREDNTIALS OFFERED: VCLA

Blue Ridge Community College dual-enrollment credit available at student's own expense *(EDU 200, 3 credits).*

Teachers for Tomorrow II

GSTFTII ***Capstone Fulfillment Course**

Grade 12 **1 Elective credit – Not Weighted**

Pre-requisite: Teachers for Tomorrow I

This is the second teaching course in the GO2TEACH 2 year-program which provides students a more extensive and continued opportunity for on-site teacher practicum to further explore the teaching profession.

Human Communication

Acting I*

ART055

Grade 11 **1 Elective credit**

Pre-requisite: None

Acting is a craft involving skills that can benefit everyone. Through this course, students will explore acting technique that may be used to further a career, as well as improving their abilities to communicate, create, focus, analyze, carry themselves with confidence, and work with others effectively. Students will have the opportunity to explore the fundamentals of the acting process, including basic terminology, use of voice and body, creativity and imagination, working/communicating with an ensemble, analyzing a dramatic text, and creating and portraying characters.

Students enrolled in this class will have the opportunity for public performance.

Acting II*

ART057

Grade 12 **1 Elective credit**

Pre-requisite: Acting I; or permission of director.

Students will review and expand upon basic stage terminology, the importance of ensemble, scene and character analysis, the rehearsal process, criticism, audition preparation, and acting as a business. Students will work primarily with Michael Shurtleff's Audition and Melissa Bruder's A Practical Handbook for the Actor, as well as with any scenes and monologues selected or assigned from various plays. The emphasis of Studio Acting II will be on preparation for collegiate and professional auditions; refinement of rehearsal and performance practices culminating in a senior showcase, familiarization with acting techniques that a working actor needs; and exploration of different styles of acting that may arise in collegiate and professional theatre situations, including the methods of the major acting teachers.

Students enrolled in this class will have the opportunity for public performance.

Communications*

DEGCST110 ***Capstone Fulfillment Course**

Grade 12 **1 Elective credit**

Pre-requisite: None

A two-semester, continuous course in which you have the opportunity to acquire skills and explore communication theory, issues, challenges, and practical applications. The primary focus during the first semester is upon rhetoric and public speaking. The second semester opens up to explore nonverbal, interpersonal, small-group, intercultural, and mass communication.

Blue Ridge Community College dual-enrollment credit available at student's own expense *(CST 110, 3 credits).*

Film Studies/Film Making I*

ART168 ***Capstone Fulfillment Course**

Grade 11, 12 **1 Elective credit**

Pre-requisite: None

Film is a medium that combines many other mediums - art, photography, performance, music – and as such, we'll be approaching it in this class holistically, from as many different directions as possible. We'll be tackling not just the how of video production, but the why of filmmaking. Why should you tell a story through film? Why tell a story at all? Through a combination of part-technical production, part-analysis, part-theory, part-industry practicum, we'll explore the world of film and find the corner of it that makes each of you want to tell a meaningful story.

Film Studies/Film Making II*

ART169 ***Capstone Fulfillment Course**

Grade 12 **1 Elective credit**

Pre-requisite: Film Studies/Film Making I

This course covers the primary aspects of film production, including scripting, camera, sound, directing, editing and broadcasting. This course offering is pending student interest and staffing.

Cultural Appreciation

Humanities in Western Culture*

HUM201

Grade 11 **1 Elective credit**

Pre-requisite: None

This course approaches an introductory survey of the humanities in western culture by focusing on significant events, styles, movements, and figures in western arts and philosophy. From the thinkers, writers, and artists of ancient Greece who created the foundations of western culture, we'll follow the journey from them through to our own contemporary ideas, styles, and the ever-growing variety of expressive modes and media.

Senior Capstone Mentorship

GSENG902 ***Capstone Fulfillment Course**

Grade 12 **1 Elective credit – Not Weighted**

Pre-requisite: Mentorship Application demonstrating prior academic success in independent learning

Senior Capstone Mentorship is 45-plus hour mentorship. The uniqueness of the SVGS Mentorship is the reciprocal relationship created with the mentor organization. An embedded "give-back" project utilizes personal skills and knowledge gained as an SVGS student and requires a minimum additional 20 hours. The project's purpose is to use experiences, knowledge, and talents to design and carry out a significant, real-life, project that serves the mentor or their organization. The experience gives students the opportunity to challenge themselves to identify interests, skills and abilities and apply them. This course requires a high level of self-motivation and a strong work ethic. Students will network and make professional connections in a field that interests them as a possible career. While planning and executing a high-quality project, students will develop and strengthen skills including: organizing and managing a complex project; finding resources; doing research; creative problem-solving; collaborating; managing time; using technology effectively; communicating; presenting their work to others; and honest and constructive self-evaluation.

Begins in late March of the junior year and complete by Mid-March of the senior year.

STEM

**STEM first-year students are required to take one class in math, one class in science, and a choice of Intro to Scientific Research, Engineering I, or AP Computer Science.

Second-year students take four classes with a minimum of one math course and one science course and may take multiple classes in the same area (i.e. 2 science classes) pending their interest and needs. STEM students must complete Chemistry and Physics either at SVGS or their home high school. All second-year students must take at least one capstone fulfillment course. These courses have project-based curriculum.

Science

Physics**

GSSCI151

Grade 11, 12

1 Science credit

Pre-requisite: None

This class is required of any SVGS STEM student who will not otherwise have completed high school physics or AP Physics prior to graduation.

This course is an introduction to general physics. Topics include principles of Newtonian mechanics, rotational dynamics, electric charges, circuits, magnetism, waves, and optics. A working knowledge of algebra and trigonometry is required. Students will investigate physical phenomena through both theory (problem-solving and conceptual discussions) and experimentation. Students may opt to take the algebra-based AP Physics 1 exam at the conclusion of this course if they wish. Credit earned typically applies to algebra-based college physics courses, which are often used as science electives for non-physics or engineering majors.

AP Physics C**

GSSCI156

Grade 11, 12

1 Science credit

Pre-requisite: Physics or Calculus

Co-requisite: Calculus

This course is a Calculus-based university physics available to seniors who have successfully completed Physics OR highly motivated juniors with very strong math skills and an interest in physics or engineering. Students must have completed or be concurrently enrolled in Calculus. Heavy emphasis is placed on graphical interpretation of data, linearization of non-linear functions, mathematical modeling of various phenomena, and derivation of equations. During the fall semester, students prepare for the AP Physics C Mechanics exam. Topics include principles of motion, Newtonian mechanics, simple harmonic motion, and rotational dynamics. During the spring semester, students prepare for the AP Physics C Electricity and Magnetism exam. Topics for this course include electric charges and fields (including objects with nonuniform charge), circuits, and magnetism. Students will investigate physical phenomena through both theory (problem-solving and conceptual discussions) and experimentation. Credit earned typically applies to Calculus-based introductory courses required for students majoring in physics, engineering, or a related field.

Students take this class as part of the Advanced Placement Program (AP) at their own expense.

Chemistry**

DECHM101

Grade 11, 12 **1 Science credit**

Pre-requisite: None

This class is required of any SVGS STEM student who will not otherwise have completed high school chemistry prior to graduation.

Students explore the experimental and theoretical aspects of general chemistry while emphasizing scientific reasoning and critical thinking. Concepts will be reinforced through traditional lecture, laboratory analysis, and computer simulation/modeling. Students will demonstrate mastery of basic laboratory skills, graphical/statistical analysis, and written/oral presentation. Basic principles will also be applied to concepts in environmental chemistry and organic/ biochemistry, as a means of establishing connection and relevance to later scientific coursework and/or career options.

Blue Ridge Community College dual enrollment credit available at student's own expense (CHM 101, 4 credits).

AP Chemistry**

SCI106

Grade 12 **1 Science credit**

Pre-requisite: Chemistry

Advanced Placement Chemistry is the equivalent of a first-year, two-semester college chemistry course. Through classroom and laboratory experiences, students develop inquiry and reasoning skills that prepare them for advanced study in subsequent college courses. AP Chemistry topics include atomic structure, chemical bonding, structure/property relations, chemical reactions and stoichiometry, kinetics, thermodynamics, and equilibrium. At the end of the course, students take the AP Chemistry exam through which they may earn college credit or advanced placement.

Students take this class as part of the Advanced Placement Program (AP) at their own expense.

Intro to Scientific Research**

SCI212LS & SCI212PS

Grade 11 **1 Science credit**

Pre-requisite: None

Students explore the study of research methods through guided research and independent skill development. Students apply principles of natural sciences and applied statistics through laboratory work and simulations in order to develop understanding and skills in experimental design, data collection and analysis, and internet and print source research and citation. Students complete the guided research project, write a scientific paper, and present their results at the SVGS Research and Engineering Symposium (participation required). Students become proficient in the use of a variety of computer applications, including word processing, spreadsheet, and presentation software.

Advanced Scientific Research**

SCI2122 ***Capstone Fulfillment Course**

Grade 12 **1 Science credit**

Pre-requisite: SVGS Scientific Research

Students extend their study of research methods through independent research and work with a scientific mentor at SVGS or a local university. Students apply principles of the natural sciences and applied statistics in solving research and engineering problems. Students complete an individual research project, explore advanced data analysis and data presentation through programming, write a scientific paper, and present their results at the Shenandoah Valley Regional Science Fair at James Madison University (participation required). Students master the use of a variety of computer applications including word processing, spreadsheet, and presentation software. Additionally, students become proficient in the review, analysis, implementation, and citation of scientific literature.

Advanced Environmental Science**

DEISAT112B ***Capstone Fulfillment Course**

Grade 12 **1 Science credit**

Pre-requisite: Biology, Chemistry, and Pre-Calculus; completion of Earth Science is strongly recommended
Pre-requisite or Co-requisite: Physics

Students will investigate the following topics as they relate to conservation and management: forests, soils, terrestrial wildlife, aquatic wildlife, agriculture (crop and livestock), wetlands, aquaponics and hydroponics, outdoor recreation and the environment, technology in environmental studies and environmental law. This class will be project based, students will begin the year with projects that are assigned along with specific content needed to accomplish the projects.

James Madison University dual enrollment credit available at student's own expense (GISAT 112, 4 credits).

Aquatic Ecology**

SCI005

Grade 12 **1 Science credit**

Pre-requisite: Pre-Calculus, Biology, Chemistry; completion of Earth Science is strongly recommended
Pre-requisite or Co-requisite: Physics

Students will investigate the functional relationships and productivity of freshwater communities as they are affected by their physical, chemical and biotic environment. Organisms inhabiting lakes, ponds, rivers, streams and estuaries are studied at the population, community and ecosystem levels.

Molecular Biology**

DEGGISAT113

Grade 12 **1 Science credit**

Pre-requisite: Biology, Chemistry (all with grades of B or better) and Pre-Calculus
Pre-requisite or Co-requisite: Physics

Students investigate fundamental life processes through the use of rapidly developing technologies such as genetic engineering, immunotechnology, and the treatment and prevention of infectious diseases. Students explore content in biochemistry, cell structure and function, genetics, immunity, epidemiology, biotechnology, and bioethics. Extensive laboratory investigations on biochemistry, culture and identification of microbes, DNA extraction and amplification, and bacterial transformation enhance student understanding of the structure and function of biological molecules in the context of broad biological principles. Students become proficient in the use of technology to diagram, analyze, and present data.

James Madison University dual enrollment credit available at student's own expense (GISAT 113, 4 credits).

Mathematics

Pre-Calculus**

MTH104

Grade 11 **1 Mathematics credit**

Pre-requisite: Algebra II

Students increase their understanding of functions and their characteristics including graphing techniques, using exponential, logarithmic and trigonometric functions to solve application problems, arithmetic and geometric sequences and series, mathematical induction, limits, first and second order derivatives, and integration. Students explore the use of mathematics in the natural sciences, thus fostering an application-oriented approach to mathematics that is enhanced through the use of technology. Students make extensive use of technology as an integral part of their learning. Students improve their facility with graphing calculators and the computer packages, *Maple* and *Excel*.

Calculus**

DEGMTH263 & DEGMTH264

Grade 11, 12 **1 Mathematics credit**

Pre-requisite: Pre-Calculus with Trigonometry course

Students develop mastery of limits, the derivative and differentiation techniques, the integral and integration techniques, physics-based applications of differentiation and integration, and infinite series, including Taylor Series including tests for series convergence. Students explore the fundamental relationship between the derivative, the integral, and the Riemann Sum. Students begin their study of multidimensional calculus including vectors and parametric equations. Students enhance their learning through computer-based activities utilizing *Excel.* Dual Enrollment credits is available providing 2 semesters of college calculus credit upon completion of the course.

Blue Ridge Community College dual-enrollment credit available at student's own expense *(MTH 263 & MTH 264, 4 credits each, total of 8 credits).*

AP Calculus BC**

MTH125

Grade 11, 12 **1 Mathematics credit**

Pre-requisite: Pre-Calculus with Trigonometry course with grade of A- or better

Students master limits, derivatives and anti-derivatives of polynomial, exponential and trigonometric functions and their inverses, as well as parametric, polar and vector functions for planar curves; techniques of differentiation and anti-differentiation; continuity of functions and the Intermediate Value Theorem and Mean Value Theorem; Fundamental Theorem of Calculus; physical applications of derivatives and anti-derivatives; series of constants and tests for convergence of series; Taylor's series approximations of functions with radii of convergence and error bounding. AP Calculus BC is equivalent to 2 semesters of college calculus. At the end of the course, students take the AP Calculus BC exam through which they may earn college credit or advanced placement.

Students take this class as part of the Advanced Placement Program (AP) at their own expense.

Advanced Calculus - Multivariable**

MTH122

Grade 12 **1 Mathematics credit**

Pre-requisite: A.P. Calculus B.C. or SVGS Calculus (grade of B or better).

Students apply concepts learned during the first year of calculus to advanced problems in multi-dimensional analysis. Students investigate topics including rectangular, spherical and cylindrical coordinates, three-dimensional vectors, partial differentiation, multiple integrals and matrices. Students' understanding of multi-dimensional mathematics is enhanced with computer visualization techniques. This course is designed for students who have exceptional math skills.

Discrete Math**

DEMTH227

Grade 12 **1 Mathematics credit**

Pre-requisite: SVGS Calculus

Discrete Math is the branch of mathematics dealing with objects that can assume only distinct, separated values. This course offers a nice counterpoint to the study of continuous mathematics that students pursue in calculus. Students will study logic, set theory, and matrices. Students will understand elementary number theory, the basic techniques of proof, and the basics of counting including combinatorics and probability. The ideas of discrete mathematics inform the study of computer science and this course will emphasize the connections between them.

James Madison University dual enrollment credit available (Math/CS 227) at student's own expense.

Machine Learning**

ITE156 ***Capstone Fulfillment Course**

Grade 12 **1 Mathematics credit**

Pre-requisite: None

Machine learning is the area of study concerned with using computers to extract knowledge from data and serves as the foundational code that runs Artificial Intelligence systems. This research field combines statistics, artificial intelligence, and computer science to solve problems in many different commercial applications and research arenas, such as medical diagnosis and treatment, self-driving cars, Chat GPT, Midjourney movie recommendations, and playing chess.

Mathematical Modeling**

MTH137 ***Capstone Fulfillment Course**

Grade 12 **1 Mathematics credit**

Pre-requisite: A.P. Calculus B.C. or SVGS Calculus (grade of B or better); or permission of director.

Mathematical modeling is an area of applied mathematics that uses mathematical tools for exploring and studying real world problems. It is the process of applying mathematical reasoning to understand some aspects of our physical, biological, social, and economic environment. In this course, students will study and create models, analyze the assumptions used in forming those models, and test the models against real-world data. Students will utilize mathematics from a variety of different mathematical branches.

Statistics**

DEGMTH245

Grade 12 **1 Mathematics credit**

Pre-requisite: completion of Pre-Calculus (grade of C or better) and prior completion or concurrent enrollment in any Calculus class.

Students become proficient with the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Four broad themes woven throughout the course are sampling/experimental design, data visualization, probability, and statistical inference. Students enhance their understanding through the use of computer software packages such as *Excel* and *R*, which are used extensively to analyze, display and aide in the interpretation of data.

Blue Ridge Community College dual-enrollment credit available at student's own expense *(MTH 245, 3 credits).*

Engineering & Technology

AP Computer Science A**

ITE157

Grade 11, 12 **1 Mathematics credit**

Pre-requisite: completion of Pre-Calculus (grade of C or better) OR prior programming experience OR high interest in programming.

Students design, implement and interpret computer-based solutions to problems in several application areas using *Java.* Students become knowledgeable about programming concepts, algorithm designs, and documentation of the computer solution and proficient at writing and debugging code. The course material emphasizes those concepts outlined by the College Board and prepares students to take the Advanced Placement Computer Science test. All students will complete a creative programming project as part of the coursework.

Students take this class as part of the Advanced Placement Program (AP) at their own expense.

Advanced Computer Science**

MTH908 ***Capstone Fulfillment Course**

Grade 12 **1 Mathematics credit**

Pre-requisite: AP Computer Science A.

This course will deepen student understanding of Java programming while exploring advanced topics in software development. It will cover advanced data structures such as maps, sets, trees, and linked lists with a project-based approach. Students will be introduced to web development using Java for backend programming, mobile application development using Java for Android, game/software development using Java-based frameworks, and agent-based models. Throughout the course, students will engage in hands-on programming projects that will challenge them to apply their knowledge to real-world problems while learning software engineering principles such as testing, debugging, and version control. At the end of the course, students will create an original project to fulfill their capstone requirement.

Cyber Security & Software Operations**

ITE302

Grade 12 **1 Elective credit**

Pre-requisite: None

Students are introduced to the basics of computer networking, operating systems, system administration and network security. Course content includes an overview of networking, operating systems and other software applications, learning to perform common administrative functions in scripting environments. Students will examine PHP and PERL in the context of an Apache webserver, and use GNU BASH and Microsoft Powershell scripting from the command line to complete every day administrative functions. Course content also includes risk management, network security policy, security training, security keys, confidentiality, integrity, access, accountability, and audit ability. Participation in various industry sponsored contests *such as US Cyber Patriot and other contests* are expected.

Engineering I**

CT8450

Grade 11 **1 Elective credit**

Pre-requisite: None

This course is an introductory course designed to help aspiring engineers develop knowledge, skills and understanding of the engineering design process. Key topics include the historical significance of engineering, along with the modern engineering skills, tools and practices related to civil, mechanical, environmental and electrical engineering. Emphasis will be on teamwork and developing the ability to analyze complex problems and implementing effective solutions. This is a project-based class that will require independent thinking, communication & documentation.

Engineering II*

CT8491 ***Capstone Fulfillment Course**

Grade 12 **1 Elective credit**

Pre-requisite: Engineering I; or permission of director

Students develop the “thought-work” behind applying concepts of multi-disciplinary engineering methods. Students are immediately immersed in advanced tenements of: static and dynamic equilibrium of particles, tools, and complex elements (like the human body); use of Computer Aided Design in basic engineering modeling; test and evaluation concepts; evaluation of structural and mechanical relationships; evaluation and application of problem design criteria, design for failure concepts, precision and safety-factors mark some but are not inclusive of all the principals touched-on during the course. Engineering Methodology combines mathematics and the physical sciences to resolve problems and reverse engineer solutions. Students complete a dozen team Design Projects and solutions are presented via CAD, schematics, and detailed technical write-ups. Individuals improve math, physics and material science skills by Marcombining them to resolve problems.

Geospatial Information Systems**

DEGEOG161 ***Capstone Fulfillment Course**

Grade 12 **1 Elective credit**

Pre-requisite: None

Students will develop the skills and knowledge necessary to make use of geographic technologies such as geospatial information systems (GIS), global positioning systems (GPS), and remote sensing. The class will focus on applying GIS technology to different fields, such as environmental science, city planning, ecology and many others. Students will work with a variety of data sets, collect data, and develop their own GIS research project.

James Madison University dual enrollment credit available at student's own expense (GEOG 161, 3 credits).

Senior Capstone Mentorship

GSMTH905 ***Capstone Fulfillment Course**

Grade 12 **1 Elective credit – Not Weighted**

Pre-requisite: Mentorship Application demonstrating prior academic success in independent learning

Senior Capstone Mentorship is 45-plus hour mentorship. The uniqueness of the SVGS Mentorship is the reciprocal relationship created with the mentor organization. An embedded "give-back" project utilizes personal skills and knowledge gained as an SVGS student and requires a minimum additional 20 hours. The project's purpose is to use experiences, knowledge, and talents to design and carry out a significant, real-life, project that serves the mentor or their organization. The experience gives students the opportunity to challenge themselves to identify interests, skills and abilities and apply them. This course requires a high level of self-motivation and a strong work ethic. Students will network and make professional connections in a field that interests them as a possible career. While planning and executing a high-quality project, students will develop and strengthen skills including: organizing and managing a complex project; finding resources; doing research; creative problem-solving; collaborating; managing time; using technology effectively; communicating; presenting their work to others; and honest and constructive self-evaluation.

Begins in late March of the junior year and complete by Mid-March of the senior year.