SVGS Course Guide 2016-17

SVGS serves approximately 220 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, STEM (science, technology, engineering, and math) or AH (arts and humanities).

The ***STEM program*** requires students to complete at least three (3) credits each year, one in each of the core areas. Students may choose an additional credit as an optional independent study. Seniors may complete four credits in the core areas.

The ***AH program*** requires students to complete four (4) credits in one of two tracks, Visual Arts or Theatre Arts. Student in both programs complete a humanities course, which addresses the Standards of Learning for 11th or 12th grade English, as well as appropriate studio classes, crafts and skills class, and an elective each year.

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. Admissions is offered to approximately 65% of all applicants.

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

HUMANITIES

Humanities I*+ 152125

Grade 11 **1 English credit**

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 ENG 111/College Composition/and 112, 3 credits each at student's own expense.

Humanities II* 152225

Grade 12 **1 English credit**

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.

Students who have successfully completed the BRCC pre-requisites may opt to take this class for JMU credit (HUM 200, 3 credits) at student's own expense.

MATHEMATICS

Pre-Calculus* 316220

Grade 11 **1 Mathematics credit**

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* 317725

Grade 11 or 12 **1 Mathematics credit**

Pre-requisite: Any Pre-calculus course

Students become proficient with limits, the derivative and differentiation techniques, the integral and integration techniques, basic applications of differentiation and integration, and infinite series, including Taylor Series. 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 *Maple* and *Excel.*

Student must take this class for Blue Ridge Community College dual enrollment credit (Math 173-174, 5 credits each) at student's own expense.

AP Calculus BC* 317730

Grade 11 or12 **1 Mathematics credit**

Pre-requisite: A SVGS or dual-enrollment Pre-Calculus class (grade of A- or better). Prerequisites may be waived by the Director.

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. Students become proficient with *Maple* and *Excel.* This course prepares students to take the BC version of the Advanced Placement Calculus test, which is a required activity.

AP Statistics* 319220

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 experimental design, measures of central tendency, anticipating patterns, mathematic modeling and statistical inference. Students enhance their understanding through the use of computer software packages such as *Excel* and *JMP*, which are used extensively to analyze, display and aide in the interpretation of data. This course prepares students to take the Advanced Placement Statistics test, which is a required activity.

Discrete Mathematics* 315410

Grade 12 **1 Mathematics credit**

Strongly recommended for students taking AP Computer Science

Discrete Mathematics 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. It is strongly recommended for students taking AP Computer Science.

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

Advanced Calculus: Multivariable Calculus* 317800

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.

SCIENCE

College Physics* 451025

Grade 11 or 12 **1 Science credit**

Pre-requisite: Algebra II/Trigonometry

Students conduct extensive laboratory investigations on topics including Newtonian mechanics, optics, electromagnetism, and materials science. Students' investigations and assignments integrate the physical sciences with mathematics. Students enhance their learning through the use of technology to analyze and present data, and simulate experiments.

BRCC dual enrollment credit available at student's own expense (PHYS 201 (Semester 1)/202 (Semester 2), 4 credits each semester).

Environmental Chemistry* 447025

Grade 11 or 12 **1 Science credit**

Pre-requisite: Physics

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

Students master basic principles of chemistry and statistical analysis in the context of the chemical and physical characteristics of water, soils, rocks, the atmosphere and natural fuels. Students conduct extensive laboratory

analysis and field sampling utilizing EPA methods where feasible. Students investigate anthropogenic influences on natural materials cycles from the viewpoint of the classical chemist. Students enhance their learning through the use of instrumental analysis, which supplements traditional micro and wet chemistry methods. Students will demonstrate mastery of computerized data recording, calculation and analysis; graphical presentation; researching primary and popular literature; and formal report writing and scientific presentation. This class is required of any SVGS student who will not otherwise have completed high school chemistry prior to graduation.

James Madison University dual enrollment credit available (ISAT 112, 3 credits) at student's own expense.

AP Chemistry* 447000

Grade 11/12 **1 Science credit**

Advanced Placement Chemistry is designed to be equivalent to a first-year college chemistry course. Students will participate in lectures, demonstrations, activities & extensive laboratory experiments on topics such as atomic structure & quantum theory, chemical compounds, reactions & stoichiometry, states of matter & solutions, thermo-chemistry & kinetics, equilibrium, acids & Bases, electro-chemistry, nuclear Chemistry & organic Chemistry. AP Chemistry also involves applying these concepts to "every-day" life with projects such as calorimetry, efficiency, crystal growth, catalysis and water treatment.

AP Environmental Science* 427025

Grade 12 **1 Science credit**

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

Students explore geology, paleontology, atmospheric science, ecology, and technology in the context of environmental problems facing humans today. Students conduct extensive laboratory and field studies including water and air quality, soil processes, population dynamics, and community and ecosystem processes. Students enhance their learning through the use of computer simulations and models, and the use of technology to analyze and present data. Students are prepared to take the Advanced Placement Environmental Science test, which is a required activity.

James Madison University dual enrollment credit available (ISAT 112, 3 credits) at student's own expense.

Molecular and Microbiology* 432025

Grade 12 **1 Science credit**

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

Students investigate fundamental life processes through the use and study of rapidly developing technologies such as genetic engineering, pharmaceutical developments, and treatment and prevention of infectious diseases. Students conduct extensive laboratory investigations on DNA extraction, gel electrophoresis, culture and identification of microbial organisms, and biochemistry. Students enhance their understanding of biological molecules through the use of mechanical and computer molecular modeling. Students become proficient in the use of technology to analyze and present data.

James Madison University dual enrollment credit available at student's own expense (ISAT 113, 3 credits).

Modern Physics* 452020

Grade 12 **1 Science credit**

Pre-requisite: GS Physics, and GS Pre-Calculus or GS Calculus (grades of A- or better). Co-requisite: Calculus or above (offered pending enrollment).

Students explore the theoretical study of Special Relativity and Quantum Mechanics with an emphasis on computer models of the processes involved. Topics covered include Special Relativity, the Schrödinger equation, tunneling phenomena, General Relativity, Elementary Particle Physics, and the Hydrogen Atom. Students enhance their learning through extensive laboratory investigations and simulations. Students become proficient in the use of technology to analyze and present data.

Scientific Research* 432120 **Grade 11 or 12** **1 Science credit**

Pre-requisite: None
Students discover and put into practice research methods and engineering design. Students apply principles of the natural sciences and applied statistics in solving research and engineering problems. Students complete an individual research project, write a scientific paper, and submit their results for presentation at various venues, including the SVGS Research Symposium (participation is required), Regional Science Fair (participation is required) and Virginia Junior Academy of Science (optional, paper submission and participation, if accepted, is required). They make use of on-line libraries and review scholarly scientific resources.

Advanced Scientific Research* 461200 Grade 11 or 12 1

Science credit
Pre-requisite: Gov School Scientific Research
Students extend their study of research methods through independent research and work with a scientific mentor. Students apply principles of the natural sciences and applied statistics in solving research and engineering problems. Students complete an individual research project, write a scientific paper, and submit their results for presentation at various venues, including the SVGS Research Symposium (participation is required), science fairs, and paper submission to student research journals for publication. They make use of on-line libraries and scholarly scientific resources.

TECHNOLOGY

Advanced Technology* 846620

Grade 12 **1 Elective credit**
Pre-requisite: None
The primary focus is the exploration of computer technology as a tool for communicating powerful ideas in mathematics and science. Students learn to animate in two-dimensions and build interactive presentations. Students will learn to create web sites and will develop an understanding of good design. Students will also explore digital photography and digital video production. Students will build pod-casts and other means of using MP3 players such as iPods. Students will develop projects in conjunction with their mathematics and science courses. Students will also be asked to discuss ethical issues related to modern technology and to learn vocabulary associated with computers.

AP Computer Science (A)* 318520 Grade 12 1

Mathematics credit
Pre-requisite: completion of Pre-Calculus, Scientific Research and Engineering, and Physics (grades of A- or better) OR permission of the Director and Instructor.
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.

Computer Network Software Operations Networking Security 665001

Grade 12 **1 Elective credit**
Students are provides instruction in 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 Cyber Challenge and other contests* are expected. *Course offering is dependent on student interest, sufficient enrollment and staffing.*

Electric Vehicle Technology* 850900

Grade 11 **1 Elective credit**

Pre-requisite: None

Students study, create and implement designs of electrical circuits and mechanical devices based on the needs of an electric vehicle. Students create web pages to explain their cars, develop trouble-shooting methods, make presentations, and investigate environmental issues related to transportation. The hands-on approach to this course enables students to develop personally, academically, and professionally. Students compete in organized electric vehicle meets, where they learn racing strategies and safety as well as new and innovative ways to improve the school's vehicle design.

Engineering I* 849130

Grade 11 **1 Elective credit**

Pre-requisite: None

Introduction to Engineering familiarizes students with the engineering design process in a project-based learning environment. Toolkit skills such as dimensional analysis, computer-aided design, and statistical analysis will be introduced and incorporated in projects throughout the year. A project-based approach to the major branches of engineering (Electrical, Civil, Mechanical, and Chemical) will give students the opportunity to apply engineering design principles to a variety of problems while developing personal skills in teamwork and communication that are vital in the engineering profession.

Engineering II* 849140

Grade 12 **1 Elective credit**

Pre-requisite: Engineering I

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 combining them to resolve problems.

Geospatial Information Systems* 849800

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.

Students in this class must enroll for dual enrollment credit at James Madison University at student's expense (GEOG 161, 3 credits).

THEATER

Acting I* 143525

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.

Acting II* 144010

Grade 12 **1 Elective credit**

Pre-requisite: Acting I

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.

Craft and Skills Workshops I/II* 144910/144920

Grade 11 and 12 **1 Elective credit**

Pre-requisite: None

Students work with guest artists and practicing professionals on location in diverse acting spaces, including professional theatres. Students develop their skills in areas including voice and diction, Shakespeare, stage combat, movement, dance, design for the stage (lighting, costumes, set, and sound), puppetry and mask work, street theatre, children's theatre, improvisation, acting styles, and related audio-visual media skills. Students develop an understanding of life as a professional artist. *[Note: Due to the importance of basic skills such as voice and movement, some Skills and Craft course offerings will be mandatory for first-year students.]*

Introduction to Theatre* 144825

Grade 11 **1 Elective credit**

Pre-requisite: None

This course provides an overview of the theater as an art form, including historical and production points of view. It is designed as: (1) an introduction to the broad spectrum of the collaborative theatrical crafts including acting, playwriting, directing, designing (set, lighting, costuming, sound), (2) a brief overview of the history of performance and theatrical traditions, and (3) a vehicle for theatre appreciation.

Blue Ridge Community College dual-enrollment credit available at student's own expense (CST 130, 3 credits).

Dramatic Theory and Criticism* 144325

Grade 12 **1 Elective credit**

Pre-requisite: Introduction to Theatre or demonstrate exceptional talent and discipline and/or a thorough background in theatre history and dramatic literature.

Students will use a variety of critical tools and perceptual viewpoints as a basis for making informed judgments about theatre art. With Aristotle's Poetics as the starting point, students will read and discuss works of dramatic literature, criticism, and dramaturgy, observe and critique theatre performances (both live and filmed), and research and compose play analyses, creative projects, and production concepts. This course focuses on major western theatrical periods, including 20th century reactions against and modifications to realism.

VISUAL ARTS

Studio Art I* 915000

Grade 11 **1 Elective credit**

Pre-requisite: None
Students study many styles, topics, and techniques using a wide variety of media with the intention of receiving a breadth of knowledge from which to develop their own personal style. Emphasis is on basic skills development, self-expression and experimenting with materials and techniques. Students focus on art production using two- and three-dimensional media and building upon their prior studio experience. A portion of class time is devoted to improvement of basic drawing and design skills. The students begin developing a body of work to use for their portfolio. Students utilize the language of the visual arts and understand, evaluate, and celebrate art in its historical and cultural context as a multicultural means of communication. Students develop critical thinking and communication skills as they articulate their personal responses to the aesthetic qualities of works of art.

Studio Art II* 914715

Grade 12 **1 Elective credit**

Pre-requisite: Studio Art I
Students continue exploration of media and techniques with an emphasis on portfolio development through focused study of utilizing the elements and principles of design and in-depth investigation of self-selected topics. Students select an area of concentration in two-dimensional, three-dimensional, or drawing media, according to the course description for Advanced Placement Studio Art. A schedule of proposed projects in these concentration areas are individually arranged with their instructor. Students also complete project work assigned by the instructor and continue to develop drawing and design skills, especially color and theory, through regular exercises in these areas. Through these assignments and the student-directed concentration projects, students create a body of work representing their own personal style for their portfolio. Students may opt to take this course for Advanced Placement Studio Art credit at their own expense by submitting a portfolio completed through the work created in this course.

This course is also available as Advanced Placement.

Survey of World Art I* 916600

Grade 11 **1 Elective credit**

Pre-requisite: None
This course is a traditional art history survey course. It covers artistic traditions from Prehistoric art to the transition from the art of the Middle Ages to the art of the Renaissance. Students will learn about art from an historical and cultural perspective during this period of time by examining major forms of artistic expression from world cultures including European, African, Near Eastern, Asian, and Central, South, and Native American. Students will analyze and critique these artistic styles in architecture, sculpture, painting, and other art media. Part of the course is also devoted to art appreciation. Students develop skills in evaluation and judgment through increased knowledge of the range of media, techniques, and stylistic approaches utilized by artists. Students will study aesthetics and criticism, in addition to art history.

Blue Ridge Community College dual-enrollment credit available at student's own expense (ART 201, 3 credits).

Survey of World Art II* 916700

Grade 12 **1 Elective credit**

Pre-requisite: Survey of World Art I
This course is an introduction to art and architecture of the world from the Renaissance through Modern ages, including European Renaissance, Baroque, Enlightenment, 19th and 20th centuries, as well as Asian and African arts. Students will analyze and critique these artistic styles in architecture, sculpture, painting, and other art media. Part of the course is also devoted to art appreciation. Students develop skills in evaluation and judgment through increased knowledge of the range of media, techniques, and stylistic approaches utilized by artists. Students will study aesthetics and criticism, in addition to art history. They will learn to analyze, interpret, and judge.

Blue Ridge Community College dual-enrollment credit available at student's own expense (ART 202, 3 credits).

Art Craft and Skills Wkshops I/II* 916300/916400

Grade 11-12 **1 Elective credit**

Pre-requisite: None

Students will specialize in exploration of specific media and techniques through study with guest professional artists who are willing to share their knowledge and skills with them. Students will be offered two- and three-dimensional topics on a six to eight week basis. Classes may be taught at SVGS or may be taught at studio spaces in the community. By working with professional artists, students will learn about the career of an artist and the experience of working in the art world. The students also receive an in-depth studio experience in which experimentation, exploration, and individual development are encouraged.

Senior Capstone 229970

Grade 12 (required for returning seniors only) 1 Elective credit

Pre-requisite: None

The Senior Capstone is a long-term project embedded in your SVGS curriculum. Its purpose is to encourage you to use your academic work to design and carry out an original, significant, real-life, project outside the classroom. The project will demonstrate your ability to synthesize and make use of all that you are learning at SVGS by designing and implementing your own authentic learning experience. This course supports the completion of your capstone project which will give you the opportunity to challenge yourself to put together your interests, skills and abilities and apply them to a real-life project. Students will network and make professional connections in a field that interests them as a possible career; grow in their ability and skill to plan and execute a project of this nature, including: organizing and managing a complex project; finding resources; doing research; creative problem-solving; collaborating; managing time; using technology effectively; communicating, and people skills; presenting their work to others; and honest and constructive self-evaluation.