



Governor's School for Science, Math & Technology

2022-2023	Mountain Vista Governor's School At-a-Glance
<b>Mission</b>	The mission of Mountain Vista Governor's School is to present a research-based, technology-enhanced, integrated program in mathematics, science, and the humanities. The program will challenge students to reach their full potential as independent thinkers capable of assuming leadership roles in a constantly changing global society.
<b>School Day</b>	<ul style="list-style-type: none"> <li>● 4.5 hour Governor's School daily instruction</li> <li>● 7:30 a.m. - 11:00 a.m.- student on-site day</li> <li>● 1 day a week for Focused Learning Experiences (FLEX) e.g. seminars, STEAM, field experiences, special events</li> <li>● Web-communication systems to provide additional instructional time</li> </ul>
<b>Yearly Schedule</b>	<ul style="list-style-type: none"> <li>● Yearly academic calendar designed for best fit with participating divisions' calendars</li> <li>● Web-communication systems utilized when some students cannot be present due to weather, holidays, or other circumstances</li> </ul>
<b>Number of Students and Grade Levels</b>	<ul style="list-style-type: none"> <li>● Middletown Site—100+ high school students</li> <li>● Warrenton Site—100+ high school students</li> <li>● Grades 10-12</li> </ul>
<b>Site Description</b>	<ul style="list-style-type: none"> <li>● Two sites at Laurel Ridge Community College               <ul style="list-style-type: none"> <li>▪ Fauquier Campus to serve Culpeper, Fauquier, and Rappahannock</li> <li>▪ Middletown Campus to serve Clarke, Frederick, Warren, and Winchester City</li> </ul> </li> <li>● Sites connected by technology for two-way interaction among teachers and students</li> <li>● Lab facilities to support project-based and technology-enhanced learning opportunities</li> </ul>
<b>Curriculum Focus</b>	<ul style="list-style-type: none"> <li>● Science, Mathematics, Humanities, Research</li> <li>● Emphasis on interdisciplinary connections</li> <li>● Scholarly research with authentic application</li> <li>● Collaboration among faculty and students with community partnerships</li> <li>● Technology integration in all aspects of learning</li> <li>● Opportunity to earn college credit</li> </ul>
<b>Instructor Qualifications</b>	<ul style="list-style-type: none"> <li>● Content-area expertise with extensive teaching experience</li> <li>● Advanced degrees including gifted education training/endorsement</li> </ul>
<b>Diploma/Transcripts</b>	<ul style="list-style-type: none"> <li>● School Division diploma with Virginia Academic-Year Governor's School Seal</li> <li>● School Division transcript in addition to Laurel Ridge transcript for dual enrolled courses</li> <li>● Opportunity to earn an Associate's Degree or General Studies Certificate from Laurel Ridge upon high school graduation</li> </ul>
<b>Guidance Services</b>	<ul style="list-style-type: none"> <li>● College admission and scholarship counseling provided by MVGS counselors in addition to base school counseling support</li> </ul>
<b>Community Support</b>	<ul style="list-style-type: none"> <li>● Laurel Ridge Community College</li> <li>● MVGS Foundation 501(c)(3)</li> </ul>
<b>Summer Programs</b>	<ul style="list-style-type: none"> <li>● New Student Orientation</li> <li>● Summer Enrichment Opportunities</li> </ul>
<b>Distance Learning</b>	<ul style="list-style-type: none"> <li>● Web-communication to expand time for student-teacher interaction</li> <li>● Possible use of on-line courses to meet individual needs</li> <li>● Virtual/community research experiences to enhance classroom learning environment</li> </ul>
<b>Application/Selection</b>	<ul style="list-style-type: none"> <li>● Standard Application Packet using a multi-criteria format</li> <li>● School divisions' selection committees select students to attend</li> </ul>
<b>Transportation</b>	<ul style="list-style-type: none"> <li>● School divisions provide transportation from base schools to Laurel Ridge</li> </ul>

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Most up-to-date information available at [www.mvgshome.org](http://www.mvgshome.org)

## MVGS Three-Year Program/Program of Studies

Rising 10<sup>th</sup> graders will attend MVGS for three years and will choose the science strand option during the 10<sup>th</sup> grade year.

Several courses may be available to be dual enrolled for college credit through Laurel Ridge. See the course descriptions below.

Prerequisites: Geometry; Algebra II (prerequisite for Math Analysis)      Co-requisites: General Biology

	Math	Science	Humanities	Research
<b>10<sup>th</sup> Grade</b>	<i>MVGS Math Analysis</i>	<i>MVGS Collegiate Chemistry</i>	<i>MVGS Humanities 10/English 10</i>	<i>MVGS Research 1: Introduction to Research</i>

MVGS offers two science focus options for second- and third-year students—typically 11<sup>th</sup> and 12<sup>th</sup> graders: Physics/Engineering or Biology/Life Science.

### Option I: Physics/Engineering Focus

Prerequisites: Math Analysis

	Math	Science	Humanities	Research and Elective
<b>11<sup>th</sup> Grade</b>	<i>MVGS Calculus 1</i>	<i>MVGS Physics 1: Mechanics</i>	<i>MVGS Humanities 11/English 11</i>	<i>MVGS Computer Science 1 or MVGS Psychology <b>and</b> MVGS Research 2: Individual Research Project</i>
<b>12<sup>th</sup> Grade</b>	<i>MVGS Calculus 2/3: Multivariable</i>	<i>MVGS Physics 2: Electricity and Magnetism</i>	<i>MVGS Humanities 12/ US Government</i>	<i>MVGS Computer Science 1 or 2 or MVGS Psychology <b>and</b> MVGS Research 3: Capstone Project</i>

### Option II: Biology/Life Science Focus

Prerequisites: Math Analysis, General Biology, Chemistry

Co-requisites: recommend Physics either year

	Math	Science	Humanities	Research and Elective
<b>Second Year 11<sup>th</sup> Grade</b>	<i>MVGS Statistics</i>	<i>MVGS Biology 1: Collegiate Biology</i>	<i>MVGS Humanities 11 /English 11</i>	<i>MVGS Computer Science 1 or MVGS Psychology <b>and</b> MVGS Research 2: Individual Research Project</i>
<b>Third Year 12<sup>th</sup> Grade</b>	<i>MVGS Calculus 1</i>	<i>MVGS Biology 2: Advanced Topics</i>	<i>MVGS Humanities 12/ US Government</i>	<i>Computer Science 1 or 2 or MVGS Psychology <b>and</b> MVGS Research 3: Capstone Project</i>

<b>Courses Offered</b>	<b>AP Test Option</b>	<b>Graduation Credit</b>	<b>Dual Enrollment Option</b>
MVGS Collegiate Chemistry	AP Chemistry	Science	CHM 111-112
MVGS Physics 1: Mechanics	AP Physics C / Mech AP	Science	PHY 241
MVGS Physics 2: Electricity and Magnetism	AP Physics C/ Elect. & M	Science	PHY 242
MVGS Biology 1: Collegiate Biology	AP Biology	Science	BIO 101-102
MVGS Biology 2: Advanced Topics	AP+	Science	BIO 150 & 270
MVGS Math Analysis	No	Math	Not offered
MVGS Calculus 1	AP Calculus AB	Math	MTH 263
MVGS Calculus 2/3	AP Calculus BC	Math	MTH 264 & 265
MVGS Statistics	AP Statistics	Math	MTH 245
MVGS Computer Science 1/ Research 2	AP Computer Science A	Elective	CSC 221 & 222
MVGS Computer Science 1/ Research 3	AP Computer Science A	Elective	CSC 221 & 222
MVGS Computer Science 2/ Research 3	AP+	Elective	CSC 202 & 205
MVGS Humanities 10/ English 10	No	English	HUM 201 & ENG 111
MVGS Humanities 11/English 11	*AP Language and Comp.	English	HUM 216 & ENG 111
MVGS US Humanities 12/Govt	AP Government	US Government	PLS 241 & 135
MVGS Psychology/ Research 2	AP Psychology	Elective	Not offered
MVGS Psychology/ Research 3	AP Psychology	Elective	Not offered
MVGS Research 1	No	Elective	Not offered

MVGS Academic Advisory Board recommendation is that courses earn weighted high school credit based on local division weighting policy/procedures, given the collegiate level/focus of MVGS courses. Be advised that students sign up for Advanced Placement (AP) testing through their base school counseling/testing departments, not through MVGS, if desiring that option.

\*Please see course descriptions below to ensure the course provides AP examination compatibility/preparation.\*

# Mountain Vista Governor's School Course Descriptions

**MVGS Collegiate Chemistry** Collegiate Chemistry is an introductory college chemistry course. The curriculum is laboratory based and includes study in matter and measurement, atoms, molecules, ions, ionic and covalent bonding. Second semester includes study in liquids and solids, solutions, chemical kinetics, chemical equilibrium, and acids and bases. Upon successful completion of the course, students may be capable of and suited for the Advanced Placement (AP) Chemistry examination. Dual enrollment option is provided in CHM 111 (fall) and CHM 112 (spring)

**MVGS Physics 1: Mechanics** Physics 1 is a calculus-based, first-year physics course. The primary focus of study will include the topics of Newtonian Mechanics and Thermodynamics. Inquiry-based laboratory investigations include extensive integration of technology. This course is integrated with MVGS Calculus 2. Upon successful completion of the course, students may be capable of and suited for the AP Physics C (Mechanics) examination. Dual enrollment option is provided in PHY 241 (full year).

**MVGS Physics 2: Electricity and Magnetism** Physics 2 is a calculus-based, second-year physics course. Inquiry is stressed and laboratory investigations incorporate extensive integration of technology. The primary focus of study will include the topics of Electricity and Magnetism and Modern Physics. This course is integrated with MVGS Calculus 2/3. Upon successful completion of the course, students may be capable of and suited for the AP Physics C (Electricity & Magnetism) examination. Dual enrollment option is provided in PHY 242 (full year).

**MVGS Collegiate Biology** Collegiate Biology is the equivalent of a two-semester college introductory biology course for biology majors. The curriculum is laboratory based and includes extensive integration of laboratory technology. Major units of study include Cell Processes, Ecology, Evolution and Genetics and Information Transfer. Upon completion of the course, students may be capable of and suited for the AP Biology examination. Dual enrollment option is provided in BIO 101 (fall) and BIO 102 (spring).

**MVGS Biology 2: Advanced Topics** Biology 2 is a second-year college biology course which ties together biological principles with social and ethical implications. Students will explore advanced topics which may include ecology and microbiology. This course extends beyond the AP level. Dual enrollment option is provided in BIO 150 (fall) and BIO 270 (spring)

**MVGS Math Analysis** Math Analysis develops students' understanding of algebraic, trigonometric, exponential, logarithmic and transcendental functions, and parametric and polar equations. Investigating real world data will enhance the understanding of realistic applications through modeling. Graphing calculators and computers and other appropriate technological tools will be used to assist students. This course serves as the prerequisite for MVGS Calculus and MVGS Statistics. Dual enrollment and AP testing options are not provided.

**MVGS Calculus 1** Calculus 1 is a rigorous course in calculus with analytic geometry. Topics include concepts and applications of differential and integral calculus and an introduction of elementary differential equations. Upon successful completion, students may be capable of and suited for the Calculus AB AP examination. Dual enrollment option is provided in MTH 263 (full year).

**MVGS Calculus 2/3** The course is a fast-paced calculus course which includes multivariable calculus. Topics include concepts and applications of integral calculus and an introduction of elementary differential equations, methods of integration, sequences and series, power series, Taylor and Maclaurin series, study of polar and parametric functions, three-dimensional analytical geometry, vector analysis, vector functions, multivariate functions, partial derivatives, optimization, double and triple integrals. Upon successful completion, students may be capable of and suited for the Calculus BC AP examination. Dual enrollment option is provided in MTH 264 (fall) and MTH 265 (spring).

**MVGS Statistics** This course is a study of descriptive and analytical statistics. Students will learn and apply four broad conceptual themes which include exploring data, planning a study, anticipating patterns, and statistical inference. Students will use statistics as a tool to predict, investigate, and analyze a variety of statistical and research problems. Upon successful completion, students may be capable of and suited for the Statistics AP examination. Dual enrollment option is provided in MTH 245 (full year).

**MVGS Humanities 10: Early Humanities / English 10** Examines the values and expression of ideas of selected western and non-western cultures from prehistory up to the 1300s, integrating the arts, literature, religion, and philosophy within the context of history. Students will earn one English credit, which will meet the requirement for English 10, including the Virginia Standards of Learning requirements. This course also introduces and prepares students to/for the critical processes and fundamentals of writing in academic and professional contexts. AP testing option is not provided. Dual enrollment option is concurrently provided in HUM 201 and ENG 111.

**MVGS Humanities 11: Introduction to Non-Western Cultures/English 11** Introduces students to beliefs, historical developments, and forms of creative expression that have shaped cultures in regions outside Europe and Northern America. Studies the cultures, values, creative expressions, and historical development of selected non-western regions of the world. This course also introduces and prepares students to/for the critical processes and fundamentals of writing in academic and professional contexts. Students will earn one English credit, which will meet the requirement for English 11, including the Virginia Standards of Learning requirement. Dual enrollment only option is concurrently provided in HUM 216 and ENG 111.

**MVGS Humanities 12: Political Philosophy and US Government** Humanities 12 introduces students to the key philosophies, institutions, policies, and behaviors political systems. Students will learn to apply disciplinary reasoning to assess the causes and consequences of political events, interpret data to develop evidence-base arguments, and defend political positions and solutions while cultivating ethical dispositions and leadership skills which can be applied to contemporary, domestic, and international problems. Students will earn one US Government credit, which will meet the requirements for Virginia & US Government per the VDOE. Upon successful completion of the course, students may be capable of and suited for the AP Exam in United States Government and Politics. Dual enrollment option is provided in PLS 241 (fall) and PLS 135 (spring).

**MVGS Research 1: Introduction to Research** The students' review of literature, analysis of arguments, and evaluation of experiment designs will enable them to explore basic research components. The students will use statistical and technological tools to organize and integrate information, design studies and experiments, gather data, and plan individual research projects. AP and dual enrollment options are not available.

**MVGS Psychology/Research 2 or Research 3** Students are introduced to the systematic study of the behavior and mental processes of human beings and other animals. The course covers the scientific study of behavior and mental processes, research methods, biological bases of behavior, sensation and perception, developmental psychology, learning, memory, thinking, intelligence, personality, social psychology, and psychological disorders and treatment. Upon successful completion, students may be capable of and suited for the AP Psychology Exam. Dual enrollment option is not provided

**11<sup>th</sup> Grade: Research 2**--The MVGS Independent Research Project is included in the psychology elective for juniors. Students will apply principles of effective research by engaging in academic and scientific research through quantitative studies utilizing laboratory experiments, field studies, interviews, and/or surveys. Students will develop oral, written, and technological skills through the presentation and publication of their research.

**12<sup>th</sup> Grade: Research 3**--The MVGS Capstone Project is included in the psychology elective for seniors. Students will develop and implement a plan to address a current issue, conduct research for competition and/or publication, compete in engineering design fairs and/or challenges, or participate in an internship. These activities may further extend the MVGS Independent Research Project or initiate new projects. Further individualized options are possible but will require formal faculty approval. AP and dual enrollment options are not provided for Research 2 & 3.

**MVGS Computer Science 1/ Research 2 or Research 3** Fall semester introduces problem solving and implementation of solutions using a high-level language, Python, in a structured programming environment. Spring semester focuses on problem solving methods using object-oriented programming with the Java language. Upon successful completion, students may be capable of and suited for the Computer Science A AP examination. Dual enrollment option is provided in CSC 221 (fall) and 222 (spring).

**11<sup>th</sup> Grade: Research 2**--The MVGS Independent Research Project is included in the CS elective for juniors. Students will apply principles of effective research by engaging in academic and scientific research through quantitative studies utilizing laboratory experiments, field studies, interviews, and/or surveys. Students will develop oral, written, and technological skills through the presentation and publication of their research.

**12<sup>th</sup> Grade: Research 3**--The MVGS Capstone Project is included in the CS elective for seniors. Students will develop and implement a plan to address a current issue, conduct research for competition and/or publication, compete in engineering design fairs and/or challenges, or participate in an internship. These activities may further extend the MVGS Independent Research Project or initiate new projects. Further individualized options are possible but will require formal faculty approval. AP and dual enrollment options are not provided for Research 2 & 3.

**MVGS Computer Science 2/ Research 2 or Research 3** Fall semester examines data structures (including sets, strings, stacks, queues, arrays, records, files, linked lists, and trees), abstract data types, and algorithm analysis (including searching and sorting methods), and objects. Hands-on work is performed in the C++ language. Spring semester examines the hierarchical structure of computer architecture, focusing on multi-level machine organization and using a simple assembler language to complete programming projects. Included are processors, instruction, execution, addressing techniques, data representation and digital logic. This course extends beyond the AP level. Dual enrollment option is provided in CSC 202 (fall) and 205 (spring).

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**12<sup>th</sup> Grade: Research 3**--The MVGS Capstone Project is included in this CS course for seniors. Students will develop and implement a plan to address a current issue, conduct research for competition and/or publication, compete in engineering design fairs and/or challenges, or participate in an internship. These activities may further extend the MVGS Independent Research Project or initiate new projects. Further individualized options are possible but will require formal faculty approval. AP and dual enrollment options are not provided for Research 2 & 3.