

## **Mountain Vista Governor's School**

### **Course Descriptions with Coding Number**

\*Students completing these courses may earn dual enrollment credit, pending the hiring of qualified teaching staff and Lord Fairfax Community College approval.

**MVGS Collegiate Chemistry\* 448009** 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.

**MVGS Physics 1: Mechanics \* 451019** Physics I 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 will be eligible to take the Advanced Placement (AP) Physics C (Mechanics) examination.

**MVGS Physics 2: Electricity and Magnetism\* 452029** 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 will be eligible to take the AP Physics C (Electricity & Magnetism) examination.

**MVGS Collegiate Biology\* 432019** 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 will be eligible to take the AP Biology examination.

**MVGS Biology 2: Advanced Topics\* 432029** 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 genetics and microbiology. This is a post AP level course.

**MVGS Environmental Science 428009** This course is the equivalent of a two-semester college introductory environmental science course. It is an interdisciplinary course, tying together the political, social, economic, and ethical aspects of environmental issues with geological, biological, and chemical principles. Upon successful completion of the course, students will be eligible to take the AP Environmental Science examination.

**MVGS Math Analysis \*316209** Math Analysis develops students' understanding of algebraic, trigonometric, exponential, logarithmic and transcendental functions, parametric and polar equations and vectors. 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.

**MVGS Calculus 1 \* 317519** 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 will earn dual enrollment credits in calculus and be eligible to take the Calculus AB AP examination.

**MVGS Calculus 2/3 \* 317809** 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, sequences and series, three-dimensional analytical geometry, vector analysis, partial derivatives, optimization, double and triple integrals. Upon successful completion, students will be eligible to take the Calculus BC AP examination.

**MVGS Statistics \* 319109** 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 will earn dual enrollment credits in statistics and be eligible to take the Statistics AP examination.

**MVGS Linear Algebra with Special Topics\* 323509** This course will provide an opportunity to complete a semester course in college-level Linear Algebra. Content will include matrices, vector spaces, determinants, solutions of systems of linear equations, basis and dimension, eigenvalues, and eigenvectors. Second semester, the class will explore topical areas of interest to or needed by the students. Prerequisite: MVGS Calculus 1 or AP Calculus AB

**MVGS Humanities 10: The Power of Thought / English 10\* 114009** Beginning with philosophical systems of thought, this Humanities course will engage students in an exploration of the philosophical and historical foundations of knowledge against the broader background of Western thought as it applies to classical and modern literature, science, and mathematics. Emphasis is on examining the contributions of key thinkers to classical and contemporary cultural and scientific thought, with an eye toward understanding the shifting nature of knowledge and the folly of certainty. Students will earn one English credit, which will meet the requirement for English 10, including the Virginia Standards of Learning requirements.

**MVGS Humanities 11: The Search for Identity/English 11\* 115009** Engaging in an exploration of the human drive for individual identity across cultures and time, this Humanities course will require students to develop an understanding of the concepts of self, maturity, citizenship, and the questionable attainment of perfection. Emphasis is on the themes found in literature, psychology, philosophy, and science which illuminate the quest to establish our identities within the framework of our communities and the broader context of human experience. Upon successful completion of the course, students will be eligible to take the AP English Language and Composition Exam. Students will earn one English credit, which will meet the requirement for English 11, including the Virginia Standards of Learning requirement.

**MVGS Humanities 12: Political Philosophy and US Government\* 244009** Humanities 12 introduces students to the key philosophies, institutions, policies, and behaviors of the American political system. 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 real-world problems. Upon successful completion of the course, students will be prepared for the AP Exam in United States Government and Politics. Students will earn one US Government credit.

**MVGS Research 1: Introduction to Research\* 011519** 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. One high school credit is given for this course.

**MVGS Psychology/Research 2 or Capstone Thesis\* 290809/290819** Students are introduced to the systematic study of the behavior and mental processes of human beings and other animals. They will describe and compare different theoretical and historical approaches to explaining behavior and distinguish between the different domains of psychology. Students explore professional ethics and standards, as well as current issues. The course will prepare students for the AP Psychology Exam.

*Psychology for 11<sup>th</sup> Grade:* 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.

*Psychology for 12<sup>th</sup> Grade:* The MVGS Capstone Thesis 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 individual projects of the Independent Research Project or initiate new projects. Further individualized options are possible but will require formal faculty approval.

**MVGS Economics/Research 2 or Capstone Thesis\* 280809/280819** Students develop critical thinking skills through the understanding, application, and analysis of micro and macroeconomic concepts and structures. Students will gain an understanding of economics principles as they apply to free markets and global systems. They will develop familiarity with economics models and graphs, scarcity and choices, supply and demand, elasticity, economic performance measures, national income and price determination, the financial sector, factors that affect income and economic growth, and stabilization policies. Students will gain an understanding of their role in the financial markets. The course will prepare student for the AP Macroeconomics Exam and can be used to meet the Economics and Personal Finance diploma requirement.

*Economics for 11<sup>th</sup> Grade:* The MVGS Independent Research Project is included in the economics 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.

*Economics for 12<sup>th</sup> Grade:* The MVGS Capstone Thesis is included in the economics 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.

**MVGS Computer Science 1/ Research 2 or Capstone Thesis\* 318609/318619** Computer Science introduces students to the fundamental topics of computing, including problem solving, designing strategies and methods, creating data structures, designing algorithms, analyzing possible solutions, and exploring ethical and social implications of computing. The course will emphasize both object-oriented and imperative problem solving. Upon successful completion, students will earn dual enrollment credits in computer science and be eligible to take the Computer Science A AP examination.

*Computer Science for 11<sup>th</sup> Grade:* 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.

*Computer Science for 12<sup>th</sup> Grade:* The MVGS Capstone Thesis 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.

**MVGS Computer Science 2/ Research 2 or Capstone Thesis \* 318629/318639**

This project-based course will offer a variety of topics which emphasizes database connectivity, inner classes, collection classes, networking, and threading. A problem solving approach will be used as students explore problems of personal interest, design solutions and algorithms, and analyze outcomes using technology and programming. Upon successful completion, students will earn dual enrollment credits in computer science. This is a post AP level course.

*Computer Science for 11<sup>th</sup> Grade:* 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.

*Computer Science for 12<sup>th</sup> Grade:* The MVGS Capstone Thesis 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.

*Approved by the MVGS Governing Board November 21, 2005 Revisions approved by MVGS Governing Board June 8, 2017*