Virginia Board of Education Agenda Item

Agenda Item: B **Date:** June 27, 2013

Title	Final Review of Proposals to Establish the following Governor's STEM Academies: 1) Fairfax County Public Schools Governor's STEM Academy at George C. Marshall High School; 2) Harrisonburg City Public Schools Governor's STEM Academy at Harrisonburg High School; and 3) Montgomery County Public Schools Governor's STEM Academy at Christiansburg High School		
Presenter	Ms. Lolita B. Hall, Director, Office of Career and Technical Education Services Jeff McFarland, Academy Coordinator, Marshall High School, Fairfax County Public Schools J. Patrick Lintner, Executive Director for Instruction, Harrisonburg City Public School Rick Weaver, Career and Technical Education Supervisor, Montgomery County High School		
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Purpose of Presentation:
Other initiative or requirement. Specify below:
Final review of proposals to establish the following Governor's STEM Academies:
1) Fairfax County Public Schools Governor's STEM Academy at George C. Marshall High School
2) Harrisonburg City Public Schools Governor's STEM Academy at Harrisonburg High School; and
3) Montgomery County Public Schools Governor's STEM Academy at Christiansburg High School

Previous Review or Action:
Previous review and action. Specify date and action taken below:
Date: May 23, 2013
Action: First Review

Action Requested:
Final Review: Action requested at this meeting

Alignment with Board of Education Goals: Please indicate (X) all that apply:

X	Goal 1: Accountability for Student Learning
	Goal 2: Rigorous Standards to Promote College and Career Readiness
X	Goal 3: Expanded Opportunities to Learn
	Goal 4: Nurturing Young Learners
	Goal 5: Highly Qualified and Effective Educators
	Goal 6: Sound Policies for Student Success
	Goal 7: Safe and Secure Schools
	Other Priority or Initiative. Specify:

Background Information and Statutory Authority:
Goal 1: The Academy must meet rigorous criteria established by the Board of Education. Students progress in academic and technical knowledge and skills; and their employability knowledge and skills are monitored and measured annually to ensure successful transition to college and career.

Goal 3: The Governor's STEM Academy is designed to expand opportunities for the general student population to acquire STEM literacy and other critical skills, knowledge, and credentials that will prepare them for high-demand, high-wage and high-skill careers.

Partnerships establishing academies must include at least one public school division, business and industry, and postsecondary education. On November 29, 2007, the Board of Education approved the criteria to establish a Governor's STEM Academy. Subsequently, on March 19, 2008, the Board approved the standards for the Governor's Career and Technical Education Exemplary Standards Awards Program, which all Career and Technical Academies must implement.

The State Council of Higher Education for Virginia (SCHEV) has reviewed the proposals and recommends approval by the Board of Education. Staff members of the Virginia Department of Education (VDOE) have reviewed the proposals in the context of the established criteria. An executive summary of the proposals is in Attachment A.

Currently, there are 19 Governor's STEM Academies in Virginia. They are located in Arlington County, Carroll County, Chesapeake City, Chesterfield County, Fairfax County, Halifax County, Hampton City, Loudoun County, Lynchburg City, New Kent County, Newport News City, Pulaski County, Richmond City, Richmond County, Roanoke County, Russell County, Stafford County, Suffolk City, and Virginia Beach City.

Summary of Important Issues:
1) Proposal to Establish the Fairfax County Public Schools Governor's STEM Academy at George C. Marshall High School

Marshall High School Governor's STEM Academy in collaboration with its partners: Fairfax County Public Schools, Systemic Solutions, George Mason University, Virginia Tech, Positek.net LLC, Tysons Regional Chamber of Commerce, Junior Achievement of Greater Washington, Marymount University, TerraWi, Cisco Systems, and Watnee LLC, will provide students the foundational skills needed to pursue career pathways within information technology and engineering. The Academy is centrally located within Northern Virginia's Tysons Corner and twelve miles west of the District of Columbia. Because of its central location, partnerships with local businesses, post secondary articulation and dual enrollment agreements, the Governor's STEM Academy will be uniquely poised to meet the mission: increase student access to STEM specific instructional programs and pathways in career and technical education; and develop a highly-skilled, diverse STEM high school graduate prepared for postsecondary education or the global workforce. The Academy will have the capacity to enroll 400 students, grades 9-12. During the 2013-14 school year 150 students will be admitted.

The Academy will focus on the following two career pathways within two career clusters:

CAREER CLUSTER	CAREER PATHWAY
Information Technology	Network Systems
Science, Technology, Engineering, and Mathematics (STEM)	Engineering and Technology

Students enrolled in the Network Systems pathway will learn about the design, development and management of different types of software programs and hardware. This field requires a rigorous foundation in mathematics and science as well as high technical skills. The study of cyber security is an emerging field with many career possibilities. Digital defense is not only for those working in technology, government, or law enforcement jobs. Cybersecurity affects any business or organization that uses internal computer systems or connects to the Internet to do business, including those in: homeland security, public and private cyber monitoring, health care information protection, energy industry systems protection, banking, education, online retail, product development, and technology products and services. The coursework will focus on systems, networks, and technology. Students will gain specific cybersecurity skills in the ethics and legal issues related to data gathering and protection; engage in real-world plans and processes for common security scenarios, techniques and technologies that protect data and systems; and will learn about ways to detect and defend against cyber attacks.

The Information Technology (IT) lab will include 32 data drops and wireless connectivity for computer workstations, mobile devices, and laser printers. It will be fully equipped for interactive teleconferencing. Students will study collegiate-level software applications such as Microsoft's Network Administration and Security, Cisco CCNA and Healthcare, Oracle, and A+ computer systems technology to optimize interaction, critical thinking, and problem-solving capabilities in the IT field. The lab has two primary zones that allow independent study and group sessions to occur simultaneously. The *Cyber Center* encourages hands-on applications in a virtual lab environment to increase students' ability to reduce vulnerabilities in today's computer network systems. In the *Networking Center,* students will have the appropriate equipment to develop flexible network configurations.

As technology advances across the globe, it is important to have individuals who understand and can support the new technological demands. Network Systems and Data Communications Analysts are predicted to see a 53 percent increase in employment opportunities.

Students enrolled in the Engineering and Technology pathway will engage in rigorous problem-solving experiences. They will learn how to use their knowledge of science, mathematics, logic, and economics to find suitable solutions to real-world problems. The STEM lab will be equipped for 21st century learning. The lab will offer collegiate-level applications and sophisticated technologies to optimize research, interaction, and critical thinking among the students. The lab will have two primary zones that allow independent study and group sessions to occur simultaneously. The *Think Tank* will encourage students to think out loud and it will be equipped to support global conferencing. In the *Lab Zone* students will have appropriate equipment for the flexibility to conduct many experiments. An overhead gridding system and large tabletops will allow for optimal connections to equipment, while speakers and microphones transmit throughout the lab. Additional equipment will include a wind tunnel, Computer Numerical Control (CNC) machines, 3D prototype printer, large format printer, plasma cutter, and computer workstations with computer-aided design (CAD) software.

Over the next decade, jobs aligned with advancing technology are predicted to boom as new career opportunities open. Individuals with college degrees and experience working with high-tech laboratory equipment have the most potential for success within this industry.

2) Proposal to Establish the Harrisonburg City Public Schools Governor's STEM Academy at Harrisonburg High School

As the world and Virginia are changing rapidly, it is predicted that areas such as health, energy, environment, and natural resources will have serious personal, social, and global issues for current and future populations to solve. Outside the typically educational setting, science, technology, engineering, and mathematics (STEM) are integrated naturally to study and solve problems. The proposed Harrisonburg High School Governor's STEM Academy emphasizes an integrative (I-STEM) learning approach to prepare students for meeting the challenges of today and the near future. The I-STEM model consists of specific units that are collaboratively developed based on the Science Standards of Learning and integrated with those from language arts, mathematics, social science, technology as well as engineering content.

Harrisonburg City Public Schools (HCPS) provides all students in all five elementary schools and both middle schools with daily science and mathematics education including units designed as integrative lessons in I-STEM. By creating a Governor's STEM Academy, HCPS expects to raise student aspirations and attract more students to postsecondary education in preparation for the career pathways of Engineering and Technology, and Science and Mathematics. The Academy will have the capacity to enroll 296 students, grades 9-12. During the 2013-14 school year 98 students will be admitted.

The Academy will focus on the following two career pathways within the STEM career clusters:

CAREER CLUSTER	CAREER PATHWAY
Science, Technology, Engineering, and Mathematics (STEM)	Engineering and Technology
	Science and Mathematics

In the seventh and eighth grades, students have an opportunity to participate in the Middle School STEM Exploration Academy, where they integrate career and technical education courses with science courses and explore different career options based on their interests. Whether students choose to apply to and enter the Harrisonburg High School Governor's STEM Academy in either of the two pathways, they will have access to Advanced Placement and dual enrollment science and mathematics courses as well as the opportunity to receive postsecondary certificates including the Governor's certificate of recognition for the Early College Scholars Program. Students entering engineering and technology pathways will be completers in Engineering Studies. Coursework will be enhanced through integration with physics, algebra II, Earth Science, chemistry, and English. Students in both pathways will take science and mathematics courses their junior and senior years, including several Advanced Placement and dual enrollment courses with the opportunity for mentorships or internships with Academy's higher education and/or business partners that include: James Madison University, Blue Ridge Community College, Blackwell Engineering, Rockingham Group, Shenandoah Valley Electric Cooperative, Serco, Kawneer, Shenandoah Valley Technology Counsel, and Stanford Research Institute.

Students in the Academy will be immersed in problem and project-based learning in grades nine through twelve. Students in both pathways are required to participate in extracurricular activities including, but are not limited to the Academic Competition Team, Bib Blue 'Botics (HHS FIRST Robotics team), Environthon, and attendance at local science and mathematics lectures.

According to the Virginia Workforce Connection, as of September 10, 2012, there were 14,200 unfilled professional, scientific, and technical services jobs in Virginia. Graduates seeking well-paying careers need not search fare if their skill sets are a match for the opportunities. In

Harrisonburg and neighboring Rockingham County, there are many science and technology-oriented businesses and industries looking to hire talented, well-educated workers. The positions available include those requiring some college and experience as well as those requiring engineering associates degrees, Masters of Engineering, and Doctorates.

Students graduating from the Harrisonburg High School Governor's STEM Academy will have a strong academic preparation for entering a four-year college majoring in a wide variety of STEM fields. They will be well-prepared to continue education in any of Virginia's high-demand fields of economic growth as identified by the Virginia Economic Development Partnership, including: food processing, clean energy, biotechnology research and development, federal security agencies and providers, information technology, aerospace, and global logistics.

3) Proposal to Establish the Montgomery County Public Schools Governor's STEM Academy at Christiansburg High School

The proposed Montgomery County Public Schools Governor's STEM Academy will be located at Christiansburg High School; however, some of the Academy courses will be offered at the division's other three high schools as well. Students who attend the smaller high schools will be eligible to continue a chosen program of study at Christiansburg High School with transportation provided. The Academy will have the capacity to to enroll 150 students, grades 9-12. During the 2013-14 school year 65 students will be admitted.

Virginia Employment Commission data indicates that the manufacturing industry employs the second largest number of all industries and ranks fifth in the current number of advertised jog openings in the New River Community College Region (see Appendix B). Montgomery County is the largest county served by the New River Community College. Jobs related to STEM, manufacturing, and information technology career clusters are in the top ten occupation groups represented by jobs advertised in the same region. The Montgomery County Governor's STEM Academy in collaboration with its partners: Virginia Tech, Montgomery County Department of Economic Development, New River Community College, Jeld-Wen Interior Doors, Automation Creations, OWPR Architects and Engineers, Moog Components Group, and NRV Competitiveness Center, will offer a program of study to expand students knowledge and skills in STEM literacy as it relates to advanced manufacturing. Students will gain the knowledge and skills needed to succeed in the technologically-rich workplace by learning how to work in teams, communicate effectively, and apply the principles and skill sets in STEM fields. A FIRST Robotics design and build team project will be the co-curricular component for all six pathways in the following chart. This project will be scheduled as an after school course to allow students from all pathways to participate.

The Academy will focus on the following six career pathways within three career clusters will prepare students for programs leading to bachelor's degrees, tow-year associate's degrees, Virginia Community College System diplomas and certificates, apprenticeships, and employment.

CAREER CLUSTER	CAREER PATHWAY
Science, Technology, Engineering, and Mathematics (STEM)	Engineering and Technology
Manufacturing	Manufacturing Production Process Development
	Production

Information Technology	Programming and Software Development
	Information Support and Services
	Network Systems

The FIRST Robotics program is built around a series of year-long elective courses taught by teachers from career and technical education (CTE), mathematics, and science in an after-school setting. This program is supported by Virginia Tech mechanical engineering students and professors. High school students achieve a level of familiarity and literacy in engineering and other STEM content while university students apply their engineering skills as mentors.

During the junior or senior year, Academy students will have the opportunity to apply their knowledge of STEM, as well as 21st century skills, in a real-world work experience by participating in job shadowing, internships, and/or cooperative experiences related to their chosen career path.

The pathways will have clear postsecondary objectives outlined through articulation with New River Community College, Radford University, and Virginia Tech. Every pathway in the Academy will culminate in a program of study at one of these three institutions. Whenever possible, both academic and CTE courses will be offered as dual enrolled courses through New River Community College or through the network of Project Lead the Way colleges.

In summary, the Governor's STEM Academy will provide awareness and opportunity for students and will increase the number of well-trained workers in areas that have been designated as high demand and high tech in business and industry. Offering parallel pathways with multiple post-graduation objectives will help students choose the best path before high school graduation.

Impact on Fiscal and Human Resources:
Funding for implementation must be provided at the local level.

Timetable for Further Review/Action:
The proposed beginning date is school year 2013-14 for the following:
1) Proposal to Establish the Fairfax County Public Schools Governor's STEM Academy at George C. Marshall High School
2) Proposal to Establish the Harrisonburg City Public Schools Governor's STEM Academy at Harrisonburg High School
3) Proposal to Establish the Montgomery County Public Schools Governor's STEM Academy at Christiansburg High School

Superintendent's Recommendation:
The Superintendent of Public Instruction recommends that the Board of Education approve the proposals to establish the following Governor's STEM Academies:
1) Fairfax County Public Schools Governor's STEM Academy at George C. Marshall High School
2) Harrisonburg City Public Schools Governor's STEM Academy at Harrisonburg High School
3) Montgomery County Public Schools Governor's STEM Academy at Christiansburg High School

Harrisonburg City Public Schools
Governor's STEM Academy

Executive Summary
May 6, 2013

Partnership Members:	Harrisonburg City Public Schools, James Madison University, Blue Ridge Community College, Blackwell Engineering, Rockingham Group, Shenandoah Valley Electric Cooperative, Serco, Kawneer, Shenandoah Valley Technology Counsel, Stanford Research Institute
Lead Entity and Fiscal Agent:	Harrisonburg City Public Schools
Contact Person:	Andrew Jackson HHS Governor's STEM Academy Coordinator 5-12 Science Coordinator Harrisonburg City Public Schools One Court Square Harrisonburg VA 22801 540 437-3302 540 437-3333 fax ajackson@harrisonburg.k12.va.us
Academy Location:	Harrisonburg High School
Number Students:	The Governor's STEM Academy will have the capacity to enroll 296 students, grades 9 – 12. During the initial school year (2013–2014) 98 students will be admitted.
Career Pathways:	Science and Mathematics Engineering and Technology
Academy Goals and Performance Measures:	The goal of the Harrisonburg City Public Schools Governor's STEM Academy is to promote student achievement and interest in STEM career fields to prepare students for global competitiveness in high-skill, high-wage, and high-demand STEM careers. The following program objectives and performance measures have been established by the Planning/Advisory Committee: ● preparing students for entry into continued education in a STEM field at the college or university level; ● developing 21st century skills through team approach to problem-based learning; ● allowing teachers and students to dissolve artificial barriers between disciplines; ● increasing the number of students meeting the requirements of the Advanced Studies Diploma by 10 percent over the next four years from 143 in 2012 to 157 in 2017;

- increasing participation in dual enrollment and advanced placement courses by 10 percent over the next four years from 336 in 2012 to 369 in 2017;
- increasing students receiving diplomas with the Governor's Seal by 30 percentage points over the next four years from 21 in 2012 to 27 in 2017;
- increasing the number of students receiving the Virginia Board of Education's Seal of Advanced Mathematics and Technology from zero in 2012 to 15 in 2017;
- increasing the number of students participating in the Pre-Engineering Assessment by National Occupational Competency Testing Institute (NOCTI) or the Engineering Technology Examination by SkillsUSA from zero in 2012 to 20 in 2017;
- increasing the number of students signing the Governor's Early College Scholars Agreement from zero in 2012 to 50 in 2017;
- students will conduct a capstone STEM project in their senior year;
- students will all have field experiences to gain knowledge in a STEM career;
- students will have work-based experiences through either their capstone STEM project or field experience;
- increase the HCPS on time graduation by 4 percent from 85.3 percent in 2012 to 88.7 percent in 2017;
- decrease the HCPS dropout rate by 50 percent from 5.8 percent in 2012 to 2.9 percent in 2017;
- increase enrollment and retention in postsecondary education by increasing college-bound students by 5 percent from 74 percent in 2012 to 77.7 percent in 2017;
- increase the number of students completing a college and career readiness curriculum by increasing number of students with an advanced diploma by 10 percent from 43.5 percent in 2012 to 47.9 percent in 2017;
- reduce the proportion of students requiring remediation in college by 5 percent from 2012-2017 as measured by the number of students who meet the basic college entrance criteria as determined by the Virginia Community College System; and
- increase the number of graduates employed in high-wage, high-demand and high-skill careers as monitored by postgraduate surveys.

To measure these goals for the Harrisonburg High School Governor's STEM Academy, HCPS will:

- analyze Standards of Learning scores, AP Scores and grades in mathematics and science;
- participate in research related to science competency and attitudes through a grant at James Madison University;
- monitor the attainment of college credits through dual enrollment and AP scores;
- track internships and field placements for all students;
- follow students through postsecondary academic choices and careers;
- provide graduates with a rigorous and complete college and workplace readiness curriculum that meets the requirements of the Commonwealth Scholars Course of Study in each designated pathway; and
- incorporate Virginia's Workplace Readiness Skills.

Highlights of the Program:

As a result of participating in the Governor's STEM Academy in the pathways of Science and Mathematics, and Engineering and Technology, students will:

- Gain a deeper understanding of the skills and knowledge incorporated in their fields of study;
- Benefit from specialized, project-based courses which develop critical-thinking, problem-solving, and decision-making skills, preparing them for the 21st century world;
- Acquire greater communication skills;
- Develop workplace readiness skills;
- Receive opportunities to earn industry certifications preparing them to be more competitive in the work force and when applying to advanced training schools or postsecondary institutions;
- Obtain meaningful, real-life, hands-on experiences in their career pathway; and
- Profit from opportunities for internships, mentorships, job shadowing, and cooperative education, which provide students with advantages when entering postsecondary education and/or the workplace.

Attachment B

The State Council of Higher Education for Virginia (SCHEV)

Review of the Harrisonburg City Public Schools' Proposal to Establish a Governor's STEM Academy

The State Council of Higher Education for Virginia

Review of Governor's STEM Academy Proposal

Name of Lead Entity on Proposal: *Harrisonburg City Public Schools*

Date of Review: June 5, 2013

The State Council of Higher Education for Virginia recommends approval of: *Governor's STEM Academy at the Harrisonburg High School*

Peter Blake
Director

6/7/13
Date

Attachment C

Virginia Department of Education
Governor's STEM Academy
Proposal Review Checklist

Title of Proposal: Harrisonburg City Governor's STEM Academy

Lead Entity for Proposal: Harrisonburg City Public Schools

Date of Review: May 7, 2013

Virginia Department of Education
Governor's STEM Academy
Proposal Review Checklist

I. Partnership Capacity

Partnerships desiring to implement a Governor's STEM Academy shall provide the Department of Education with evidence of the following:

Criteria	Documentation			Comments
	Full	Partial	None	
A. An active, ongoing planning committee, including a list of members and signed certifications from each that they are willing and able to serve in that capacity. At a minimum, members must represent K-12 education (superintendent or designee), higher education, and business and industry. All partners must be represented on the committee.	X			
B. An advisory committee, including a list of members and signed certifications from each that they are willing and able to serve in that capacity.	X			
C. A written memorandum of agreement among school divisions, local businesses, postsecondary institutions, and any other partners that outlines ways in which community resources will contribute to the Governor's STEM Academy to broaden the scope of students' educational experiences.	X			

Criteria	Documentation			Comments
	Full	Partial	None	
D. A statement of assurances that the Governor's STEM Academy Planning Committee has reviewed provisions of *Administrative Procedures Guide for the Establishment of Governor's STEM Academies* and agrees to follow the guidelines set forth in the document (see appendix).	X			
E. A statement of assurances that, if applicable, an ongoing Governing Board will be established to reflect current Board of Education regulations relative to jointly operated schools and programs (see appendix).	X			
Comments:				

II. Need/Rationale for the Academy

Partnerships desiring to implement a Governor's STEM Academy shall provide the Department of Education with evidence of the following:

Criteria	Documentation			Comments
	Full	Partial	None	
A. Demonstration of the need/rationale for the Academy. This statement should be concise and state the major reasons to have a Governor's STEM Academy, including need at the state, local and/or regional levels.	X			
B. A description of the enhanced or additional offerings in science, technology, engineering, and/or mathematics (STEM) that will meet the need described above.	X			
C. A fiscal agent that is a public entity, including a certification that the entity is willing and able to serve in that capacity.	X			

Criteria	Documentation			Comments
	Full	Partial	None	
Comments:				

III. Program Description

Each Governor's STEM Academy planning committee shall develop cooperatively with local school divisions, business, community, and higher education partners and have available for review and dissemination, a program description that includes:

A. A statement of program goals addressing the following criteria:

Criteria	Documentation			Comments
	Full	Partial	None	
1. Rigorous academic content in career and technical instruction;	X			
2. An emphasis on STEM career pathways;	X			
3. Individualized high school plans to ensure course selections that are aligned with students' transition and career goals after high school;	X			
4. Evidence that graduates will complete a college and work readiness curriculum, minimally at the level specified for Commonwealth Scholars Course of Study (State Scholars Core) with the possibility of pre-approved substitution of equivalent courses where there may be more relevant course selections for a particular career pathway;	X			
5. Incorporation of Virginia's Workplace Readiness Skills.	X			
Comments:				

B. A statement of program objectives and performance measures to:

Criteria	Documentation			Comments
	Full	Partial	None	
1. Improve academic achievement of Academy students;	X			
2. Increase completion of dual enrollment courses;	X			
3. Provide workplace readiness experiences for students through strong partnerships with businesses;	X			
4. Increase high school graduation rates;	X			
5. Reduce dropout rates;	X			
6. Increase enrollment and retention in postsecondary education;	X			
7. Increase the proportion of students completing a college and workplace ready curriculum in high school;	X			
8. Reduce the proportion of students requiring remediation in college;	X			
9. Increase the number of industry certifications awarded to high school students; and	X			
10. Increase the number of graduates employed in high-wage, high-demand and high-skill careers.	X			
Comments:				

C. A brief description of the proposed program, including:

Criteria	Documentation			Comments
	Full	Partial	None	
1. Site location;	X			
2. Number of students to be served;	X			
3. Grade levels;	X			
4. General curriculum design;	X			
5. List of courses to be delivered;	X			.
6. Description of how/where the courses will be delivered. Courses may be delivered on a high school, technical center or community college campus, online, or in other innovative ways; and	X			
7. Designation of full-day or part-day, academic-year program.	X			
Comments:				

D. Evidence of participation in the Governor's Exemplary Standards Award Program for Career and Technical Education

	Documentation			Comments
	Full	Partial	None	
	X			.
Comments:				

E. Program and course descriptions

E.1. At least two well-articulated career pathways must be included that meet the following criteria:

Criteria	Documentation			Comments
	Full	Partial	None	
Pathway #1				
a. Must include opportunities to earn industry credentials, postsecondary certificates, diplomas or associate degrees while in high school and pursue additional industry credentials and academic degrees at the associate, bachelor's and graduate levels. These pathways may be in the same or different career clusters.	X			
b. Must be in a field identified by a statewide authority or organization, such as the Virginia Economic Development Partnership or the Virginia Research and Technology Advisory Commission, as a strategic growth area for Virginia. Examples include biosciences, information technology, automotive technology and motor sports, as well as modeling and simulation and nanotechnology **or**	X			
c. Must address regional and local work force demand in a high-wage, high-skill field as identified by employers and work force officials.	X			
d. At least one pathway must be in a STEM-related field. This career pathway should drive the innovative capacity of the region and/or state.	X			

Criteria	Documentation			Comments
	Full	Partial	None	
Comments:				

Criteria	Documentation			Comments
	Full	Partial	None	
Pathway #2				
a. Each career pathway must include opportunities to earn industry credentials, postsecondary certificates, diplomas or associate degrees while in high school and pursue additional industry credentials and academic degrees at the associate, bachelor's and graduate levels. These pathways may be in the same or different career clusters.	X			
b. Must be in a field identified by a statewide authority or organization, such as the Virginia Economic Development Partnership or the Virginia Research and Technology Advisory Commission, as a strategic growth area for Virginia. Examples include biosciences, information technology, automotive technology and motor sports, as well as modeling and simulation and nanotechnology, or	X			
c. Must address regional and local work force demand in a high-wage, high-skill field as identified by employers and work force officials.	X			
d. Of the two pathways described, at least one must be in a STEM-related field. This career pathway should drive the	X			

Criteria	Documentation			Comments
	Full	Partial	None	
innovative capacity of the region and/or the state.				
e. Additional career pathways may address one of the areas described above, or an area identified by the partnership as an area of interest, growth, or expansion for students in the service area of the Academy.	X			
Comments:				

E.2 List of all requirements for successful program completion.

	Documentation			Comments
	Full	Partial	None	
	X			
Comments:				

E.3 Academy graduates must achieve one or more of the following benchmarks:

Criteria	Documentation			Comments
	Full	Partial	None	
a. Earn one or more industry certifications or state occupational licenses, and/or demonstrate competencies on an assessment instrument recognized by postsecondary institutions such as CLEP examinations, collaboratively designed or mutually approved end-of-course tests, college placement tests, or student portfolios reviewed by a team of college and high school faculty; **or**	X			

Criteria	Documentation			Comments
	Full	Partial	None	
b. Earn at least 9 transferable college credits as defined in the Early College Scholars program (includes dual enrollment, AP and other options); **or**	X			
c. Earn an Associate Degree.				
Comments:				

E.4 Significant work-based experience must be included representing additional instruction or training beyond the classroom such as:

Criteria	Documentation			Comments
	Full	Partial	None	
a. Cooperative Education; or				
b. Internships; or	X			
c. Job Shadowing; or	X			
d. Mentorships; or	X			
e. Project-based learning; or	X			
f. Service learning; or	X			
g. A combination of the above.				
Comments:				

F. Length of program and daily schedule: Governor's STEM Academies are defined by program content, not by the location or delivery system of courses. Evidence of the following must be submitted:

Criteria	Documentation			Comments
	Full	Partial	None	
Designation of full-day or part-day, academic-year program.	X			
Comments:				

G. Assurance from the fiscal agent that operating funds and facilities are available to support the Governor's STEM Academy and are adequate to meet the needs of the program

	Documentation			Comments
	Full	Partial	None	
	X			
Comments: .				

H. Materials and equipment to be provided to accomplish program goals and objectives.

	Documentation			Comments
	Full	Partial	None	
	X			
Comments: .				

I. Evidence of an internal evaluation process to effect program improvement, including:

Criteria	Documentation			Comments
	Full	Partial	None	
1. A review of the Academy's policies, procedures, and outcomes;	X			
2. Consideration of feedback from students, staff, parents, the	X			

Criteria	Documentation			Comments
	Full	Partial	None	
community, and partnership members; and				
3. Annual collection and reporting of data to the Department of Education related to student achievement, goal achievement, and other indicators.	X			
Comments:				

IV. Administrative Procedures

Each Governor's STEM Academy must develop and maintain procedures developed cooperatively with participating partners. There should be evidence of procedures in the four areas that follow.

A. Partnerships - The role of business and industry, public school divisions, and postsecondary institutions in the partnership. The role of workforce and economic development entities should also be included if they are among the partners.

	Documentation			Comments
	Full	Partial	None	
	X			
Comments:				

B. Student recruitment, selection criteria, and admissions.

	Documentation			Comments
	Full	Partial	None	
	X			
Comments:				

C. Code of student conduct and attendance.

	Documentation			Comments
	Full	Partial	None	
	X			
Comments:				

D. Transportation provided by the school division or consortium that is in compliance with all applicable federal and state regulations.

	Documentation			Comments
	Full	Partial	None	
	X			
Comments:				

E. Staff recruitment, selection, and assignment - The Governor's STEM Academy shall hire staff members who meet the Virginia teacher licensure requirements and/or postsecondary faculty qualifications. Where applicable, they must have industry-specific education with training and experience, including industry certification.

	Documentation			Comments
	Full	Partial	None	
	X			
Comments:				

F. Staff development - The program will provide appropriate staff training in addition to staff planning time.

	Documentation			Comments
	Full	Partial	None	
	X			
Comments:				

G. Staff evaluation – Staff will be evaluated according to the human resources policies of the agency or institution employing Academy personnel.

	Documentation			Comments
	Full	Partial	None	
	X			
Comments:				

H. Parent, student and community involvement

Criteria	Documentation			Comments
	Full	Partial	None	
1. Preparation for entering the Academies should begin by eighth grade.	X			
2. Students, parents, teachers, and counselors should work collaboratively to: a. Complete career interest inventories;	X			
b. Prepare academic and career plans outlining an intended course of study in high school;	X			
c. Review multiple postsecondary pathways and the steps required to pursue them;	X			
d. Participate in career assessments to identify areas students should strengthen to qualify for their selected pathways; and	X			
e. Discuss available diplomas, seals, and other recognitions including admission to specialized programs such as Governor's Academies.	X			

I. Documentation of insurance, budget, and other fiscal information

	Documentation			Comments
	Full	**Partial**	**None**	
Insurance	X			
Budget (from appendix)	X			
Budget Narrative	X			
Other				
Comments:				

HARRISONBURG CITY PUBLIC SCHOOLS

PROPOSAL TO ESTABLISH THE HARRISONBURG HIGH SCHOOL GOVERNOR'S STEM ACADEMY

HARRISONBURG CITY Public Schools

Partnership Capacity

Harrisonburg City Public Schools (HCPS) is unique in size, demographics, needs, resources, partners, and potential partnerships. These characteristics allow us to create focused and coherent pathways for our students that prepare them for high-skill, high-demand, and high-wage career opportunities that exist today and in the future.

The school division consists of five elementary schools, two middle schools, and one high school. Sixty-nine percent of students qualify for free and reduced lunch and over thirty-five percent of students are Limited English Proficient. Our students come from forty-three different countries and speak fifty-one different languages. Our diversity is a strength that employers and the community embrace and support. Our partnerships, proximity and interactions with James Madison University, Eastern Mennonite University, Bridgewater College, and Blue Ridge Community College, as well as a variety of science, technology, and engineering-related companies give our school division strong advantages. The capacity to form partnerships within our own supportive community is based on long-standing good relationships and is one of our strengths. Our size and proximity to such an array of potential partners makes us capable of quick and thorough implementation of new programs. HCPS is actively cultivating and increasing the scope of its partnerships with local higher education to enhance its science, technology, and mathematics education and introduce aspects of engineering education. At the same time, we are partnering with local STEM businesses and HCPS alumni in STEM careers and STEM majors to guide us in the creation of the proposed Harrisonburg High School Governor's STEM Academy.

STEM Advisory and Planning Committees

The proposal to establish the Governor's STEM Academy is part of an effort to create a comprehensive K-12 STEM emphasis in Harrisonburg City Public Schools. The effort began in spring 2012 with the creation of a Governor's STEM Academy Advisory Board consisting of representatives from local STEM businesses, faculty of local higher education institutions, HCPS teachers and administrators, college student organizations, and Harrisonburg High School alumni who have entered STEM careers. All partners have willingly worked with HCPS to plan and develop each of our grade-level emphasis on STEM and to offer advice and evaluation about curriculum and implementation. A planning committee is responsible for specific program planning and implementation, while the Advisory Board serves as a guiding voice. (See Appendix A—Governor's Academy Planning Committee Members)

Memorandum of Agreement

Each partner on the HCPS STEM Advisory Board and Planning Committee has signed a memorandum of agreement, which outlines the roles and responsibilities as a contributing partner. (See Appendix B—Memorandum of Agreements)

Statement of Assurances

The Planning Committee has reviewed the provisions of the *Administrative Procedures Guide for the Establishment of Governor's STEM Academies* and agrees to follow the guidelines set forth in the document.

Rationale

Our world and state are changing rapidly. Areas such as health, energy, environment, and natural resources will have serious personal, social, and global issues for current and future populations to solve. Outside the educational setting, science, technology, engineering, and mathematics are integrated naturally to study and solve problems. To prepare our students to meet the challenges of today and the near future, we must begin to educate our students in similarly integrated manner. In Harrisonburg, we are focused on creating curriculum and programs to better equip our students for an increasingly global and technical workplace and to bolster the students' earning power as a way to help the state and regional economies.

According to the Virginia Workforce Connection, as of September 10, 2012, there were 14,209 unfilled professional, scientific, and technical services jobs in Virginia. From Hampton Roads to Fairfax, and from Alexandria to Roanoke, the Commonwealth is a science- and technology-rich state. Students seeking well-paying careers need not search far if their skill sets are a match for the job opportunities. In the past three years, prospects for the unemployed in Virginia have been grim. For job seekers with STEM skills, however, the odds have been much better. Overall, job seekers outnumbered online job postings by 2.1-to-1. In STEM, job postings outnumbered unemployed people by 3.3-to-1. (Vital Signs, http: //vitalsigns.cbancetheeguation.org/#Virginia-Demand)

In 1998, the City of Harrisonburg established the Harrisonburg Technology Park (HTP) which currently houses several technology companies, including Serco Inc., a government contractor that provides professional, technology, and management services, and Jenzabar, an international company that delivers software, strategies, and services for teaching and learning solutions for universities and continuing education programs.

In addition to the HTP, Harrisonburg has also created a Downtown Technology Zone that currently has 14 technology-related businesses. These range from HD (High Definition) film companies to Web design groups, and from small IT companies to regional and international companies such as Mosley Architects and Rosetta Stone. In Rockingham County, the Rockingham Center for Research and Technology opened adjacent to the HTP and in 2009 welcomed its first tenant, SRI International. SRI opened the Center for Advanced Drug Research (CADRE) at its new SRI Shenandoah Valley campus, where it conducts research to help the United States respond to biological threats and to develop lifesaving treatments for neglected diseases. ("High-Tech Harrisonburg")

In the Shenandoah Valley, STEM-educated students do not need to leave their hometowns to find ample opportunities. In Harrisonburg and neighboring Rockingham County, there are many science and technology-oriented businesses and industries looking to hire talented, well-educated workers. According to http://www.indeed.com there are currently (as of April 2, 2013) 48 posted jobs for engineers in the Shenandoah Valley with half of those listed in Harrisonburg. The companies include Merck, Rosetta Stone, MillerCoors, SRI and the City of Harrisonburg along with a diverse assortment of others. The positions available include those requiring some college and experience up to those requiring engineering associate degrees, Master's of Engineering, or even Doctorates. Similarly, there are 69 positions under the heading of science with Merck, SRI, LabCorp, Rockingham Memorial Hospital, and a wide variety of other companies.

By creating a Governor's STEM Academy, Harrisonburg City Public Schools expects to raise student aspirations and attract more students to postsecondary education in preparation for the career pathways of Engineering and Technology and Science and Mathematics. The goal is

to provide prepared workers to support the Commonwealth's businesses and industries and to meet the work force needs of new businesses and industry in the Harrisonburg region while at the same time providing our students with education in areas where job opportunities exist. The U.S. Department of Labor indicates that 15 of the 20 fastest growing occupations projected for 2014 require significant mathematics or science preparation. The trends evidenced by reports from the U.S. Department of Labor, Virginia Workforce Connection, and postings on Indeed http://www.indeed.com, show increased employment opportunities and unfilled positions in STEM-related fields. Harrisonburg City Public Schools wants to educate our students to become working adults. This means preparing our students to enter STEM career pathways.

Enhanced and Additional STEM and CTE Offerings

HCPS provides all students in all five of the elementary schools and both middle schools with daily science and mathematics education including units designed as integrative lessons in science, technology, engineering, and mathematics (I-STEM). Access to career and technical education courses begins in the middle school and continues through high school to ensure our students are college and career ready.

In the seventh and eighth grades, students have the opportunity to choose an even richer integrated STEM experience by joining the Middle School STEM Exploration Academy, where they integrate career and technical education courses with their science courses. Students will have the opportunity to integrate science instruction with Technology Foundations (8403) during seventh-grade life science and Introduction to Technology (8483) during eighth-grade physical science.

During middle school, we actively help students identify the types of career pathways by developing interests and skills. As students contemplate high school programming they will have

two challenging and rewarding pathways to follow to be well prepared to enter an institution of higher learning in a STEM major. Whether students choose to apply to and enter the Harrisonburg High School Governor's STEM Academy in the Engineering and Technology Pathway or the Science and Mathematics Pathway they will have access to Advanced Placement and dual enrollment science and mathematics classes as well as the opportunity to receive postsecondary certificates including the Governor's certificate of recognition of Early College Scholars Program. Students who follow the engineering and technology pathway in the Harrisonburg High School Governor's STEM Academy will be completers in Engineering Studies (8490). In addition to completing the CTE sequence of Engineering Explorations and Engineering Analysis, these courses will be enhanced through integration with physics, Algebra II, and English in ninth grade, and Earth Science, chemistry, and English in tenth grade.

Students in both the Mathematics and Science Pathway and the Engineering and Technology Pathway of the Harrisonburg High School Governor's STEM Academy will take science and mathematics courses their junior and senior years, including several Advanced Placement-level and dual enrollment courses with the opportunity for mentorship or internship with our higher education and/or business partners.

Harrisonburg City Schools K-12 STEM Course Details

School Name & grades	Implementation	Number of students	STEM course
HCPS Elementary Schools K-4 Keister Elementary School Waterman Elementary School Spotswood Elementary School (phased over 2 years) Stone Spring Elementary Smithland Elementary	 2011-2012 2011-2012 2011-2013 2012-2013 2012-2013	2,138 428 424 392 317 433	4 I-STEM units taught through science class.
Thomas Harrison Middle School 5th-6th Grade	2012-2013 (5th) 2013-2014 (5th & 6th)	231 231	4 I-STEM lesson taught through science class
Skyline Middle School 5th -6th Grade	2012-2013 (5th) 2013-2014 (5th & 6th)	151 151	4 I-STEM lesson taught through science class
Middle School - STEM Explorations Academy 7th Grade Thomas Harrison Middle School Skyline Middle School	2012-2013	44 22 22	Physical Science (4125) & Technology Foundations (8403)
Middle School - STEM Explorations Academy 8th Grade Thomas Harrison Middle School Skyline Middle School	2013-2014	43 23 20	Life Science (4115) & Introduction to Technology (8483)
HHS Governor's STEM Academy: Engineering and Technology Pathway 9th grade	2012-2013	20	English (1130) Physics (4510) Algebra II (3135) Engineering Explorations (8450)
HHS Governor's STEM Academy: Engineering and Technology Pathway 10th grade	2013-2014	24	English (1140) Earth Science (4210) Chemistry (4410) Engineering Analysis and Applications II (8451) Geometry (3143) OR AP Statistics (3192)
HHS Governor's STEM Academy: Engineering and Technology Pathway 11th grade	2014-2015	24	Biology (4310) Trigonometry/ Advanced Algebra (3137) AP Computer Science (3185) Dual Enrollment GIS
HHS Governor's STEM Academy: Engineering and Technology Pathway 12th grade	2015-2016	24	Dual enrollment engineering AP Science P Calculus (3177) Engineering Practicum IV(8453)
HHS Science and Mathematics Career Pathway	2013-2017	160	Mathematics every year and/or 3 DE or AP mathematics/science by senior year.

Program Description

Harrisonburg City Public Schools, in partnership with the business and educational community, has worked to develop an innovative K-12 science, technology, engineering, and mathematics (STEM) pipeline that seeks to prepare students for higher educational opportunities and develop workplace readiness.

This seamless systemwide STEM educational programming begins in kindergarten and continues through postsecondary education. In grades K-6 grade, students participate in Integrative STEM education. In middle school the Harrisonburg STEM Explorations Academy offers students in seventh and eighth grade the opportunity to continue their STEM education in a uniquely blended classroom environment. Students moving from middle school to high school will have two STEM pathway options within the Harrisonburg High School Governor's STEM Academy: Engineering and Technology or Science and Mathematics.

Interested students entering Harrisonburg High School will apply to be in the HHS Governor's STEM Academy Engineering and Technology pathway or the Science and Mathematics career pathway. The proposed Governor's STEM Academy will:

- inspire students to pursue interests and rigorous coursework that will create enthusiasm and pathways for postsecondary coursework
- develop 21st century skills: critical thinking, problem solving, creative thinking and innovation, communication, collaboration, media literacy
- expand partnerships within the community to develop and broaden student opportunities
- integrate multiple disciplines and technology use through problem-based learning
- engage students with real-world problems and opportunities

- provide opportunities to take advanced classes in mathematics, science, engineering, and computer science
- cultivate a culture of STEM education that is aligned through grades K-12
- attract underrepresented groups into STEM fields
- provide graduates with a rigorous and complete college and workplace readiness curriculum that meets the requirements of the Commonwealth Scholars Course of Study in each designated pathway.

The Two STEM Pathways - Engineering and Technology or Science and Mathematics

Students in the eighth grade will have the opportunity to apply to the HHS Governor's STEM Academy and choose the Engineering and Technology Pathway or the Science and Mathematics Pathway. Twenty-four students will be accepted into the Engineering and Technology Pathway each year and at capacity 96 students will be committed to this pathway. This pathway will hold these students together as a team cohort during half of their school day at Harrisonburg High School for grades nine through twelve. Courses in the Engineering and Technology pathway are integrated and project based.

Students accepted into the Science and Mathematics Pathway will commit to enrolling in courses that meet or exceed what is set forth in the Commonwealth Scholars Course of Study. These students will also enter into the Governor's Early College Scholars Agreement. In addition to meeting these requirements, students are required to take coursework in mathematics and science every year. This pathway will admit 30-40 students each school year.

Both pathways require a commitment to extracurricular involvement in academics at HHS. This involvement includes, but is not limited to, participation on the Academic

Competition Team, Big Blue 'Botics (HHS FIRST Robotics team), Envirothon, and attendance at local science and mathematics lectures. The primary location for the Governor's STEM Academy will be at Harrisonburg High School.

Student Preparation for HHS Governor's STEM Academy

With a majority of our students being economically disadvantaged and a very large percentage being English language learners, we recognize preparation for a rigorous plan of studies in engineering, science, technology, and mathematics and increased rates of high school graduation does not begin in the ninth grade. As a consequence of this understanding every child in a K-6 classroom in HCPS receives multiple opportunities each year to participate in integrated science, technology, engineering and mathematics (I-STEM) units. I-STEM education allows students to achieve a greater understanding of the subjects they are learning, the connections between these subjects, and the world around them.

The HCPS I-STEM model consists of specific units that are collaboratively developed with teachers and integrated into the established science pacing for our division. Each problem-based unit is developed based on science Standards of Learning and integrated with those from language arts, mathematics, social science, technology as well as engineering content. Every student and teacher participates in one I-STEM unit each 9 week grading period. Each unit averages about five hours of instruction. HCPS' commitment includes a trained half-time STEM specialist that serves as support for the school throughout the entire process. An HCPS student that begins in kindergarten and continues through sixth grade will have completed 147 hours of I-STEM instruction. Each grade level also has at least one experience with a STEM professional each year. These guest speakers and field trip experiences are vital to building students' knowledge and interest regarding future pathways at the secondary level and careers beyond.

HCPS' emphasis on STEM extends to summer where students have the option of participating in our summer enrichment Program. Robotics, Waterbotics, Culinary Arts, CSI, drama and other options are available for students to attend. Through these additional opportunities, children gain additional support, building enthusiasm and confidence in their abilities and become stronger students.

In the middle school, STEM Explorations Academy students benefit from a problem-based learning approach provided by a science teacher and a technology education teacher who collaboratively plan and co-teach the students. Pairing middle school science Standards of Learning with a high school credit Technology Education course provides students with rigorous academic integrated content. Additionally, students meet CTE core competencies including Virginia's Workplace Readiness Skills for the Commonwealth. The two-year integrated curriculum includes the Virginia physical science Standards of Learning and life science Standards of Learning paired with two Virginia Career and Technical Education (CTE) courses.

The primary instructional approach uses engineering design challenges and discussion of the science concepts needed to approach the challenge in an informed manner. Then, working in small groups, students complete the challenge by following an engineering design process. Ultimately, students produce a product, analyze its performance, and communicate their results. This approach develops science content and engineering skills.

Students in the middle school STEM Explorations Academy meet science and engineering professionals through field experiences and guest speakers. Students will visit a local four-year institution's engineering department as well as Blue Ridge Community College's technical program where they learn about career pathways related to science and engineering

available at that institution. The middle school STEM explorations program creates interest in STEM studies and careers, and provides a rigorous academic background to prepare students to be successful in academically rigorous studies in the HHS STEM Governor's Academy.

Program Objectives and Performance Measures

The HCPS I-STEM program, Middle School STEM Explorations Academies, and HHS Governor's STEM Academy will elevate the teaching and learning in the STEM classrooms through integration of curriculum, promotion of STEM careers, applications to the real world and learning by doing. The Harrisonburg High School STEM Academy will build on the STEM experiences of elementary and middle school students while also welcoming students who may not have participated in either. There are several goals for the high school program, including:

- preparing students for entry into continued education in a STEM field at the college or university level
- developing 21st century skills through team approach to problem-based learning
- allowing teachers and students to dissolve artificial barriers between disciplines
- increasing the number of students meeting the requirements of the Advanced Studies Diploma by 10 percent over the next four years from 143 in 2012 to 157 in 2017
- increasing participation in dual enrollment and advanced placement courses by 10 percent over the next four years from 336 in 2012 to 369 in 2017
- increasing students receiving diplomas with the Governor's Seal by 30 percentage points over the next four years from 21 in 2012 to 27 in 2017
- increasing the number of students receiving the Virginia Board of Education's Seal of Advanced Mathematics and Technology from zero in 2012 to 15 in 2017

- increasing the number of students participating in the Pre-Engineering Assessment by National Occupational Competency Testing Institute (NOCTI) or the Engineering Technology Examination by SkillsUSA from zero in 2012 to 20 in 2017
- increasing the number of students signing the Governor's Early College Scholars Agreement from zero in 2012 to 50 in 2017
- students will conduct a capstone STEM project in their senior year
- students will all have field experiences to gain knowledge in a STEM career
- students will have work-based experiences through either their capstone STEM project or field experience.

For the HCPS STEM program, from kindergarten through a student's senior year, our goal is to provide a stimulating, exciting, accessible, and rewarding education in STEM. The culminating effects of these efforts will result in the following goals:

- increase the HCPS on time graduation by 4 percent from 85.3 percent in 2012 to 88.7 percent in 2017
- decrease the HCPS dropout rate by 50 percent from 5.8 percent in 2012 to 2.9 percent in 2017
- increase enrollment and retention in postsecondary education by increasing college-bound students by 5 percent from 74 percent in 2012 to 77.7 percent in 2017
- increase the number of students completing a college and career readiness curriculum by increasing number of students with an advanced diploma by 10 percent from 43.5 percent in 2012 to 47.9 percet in 2017

- reduce the proportion of students requiring remediation in college by 5 percent from 2012 to 2017 as measured by the number of students who meet the basic college entrance criteria as determined by the Virginia Community College System
- increase the number of graduates employed in high-wage, high-demand and high-skill careers as monitored by postgraduate surveys.

To measure these goals for the Harrisonburg High School Governor's STEM Academy, HCPS will:

- analyze Standards of Learning scores, AP Scores and grades in mathematics and science
- participate in research related to science competency and attitudes through a grant at James Madison University
- monitor the attainment of college credits through dual enrollment and AP scores
- track internships and field placements for all students
- follow students through postsecondary academic choices and careers
- provide graduates with a rigorous and complete college and workplace readiness curriculum that meets the requirements of the Commonwealth Scholars Course of Study in each designated pathway
- incorporate Virginia's Workplace Readiness Skills.

Evidence of Participation in the Governor's Exemplary Standards Award Program for Career and Technical Education

The Harrisonburg High School Governor's STEM Academy will follow the criteria for the Governor's Exemplary Standards Award Program for Career and Technical Education.

Program and Course Descriptions

Pathway 1: Engineering and Technology

Students in the Engineering and Technology pathway in the Harrisonburg High School Governor's STEM Academy will follow a prescribed plan of courses to earn an Advanced Studies Diploma that includes two Advanced Placement science classes, one or two Advanced Placement mathematics courses, Advanced Placement computer science, and two dual enrollment courses. Students will have half of their school day in the Academy. The following table provides the course plan for the Engineering and Technology Pathway:

	Freshman	Sophomore	Junior	Senior
1	Elective*	Elective*	Elective*	Elective*
2	Elective*	Elective*	English*	English*
3	World Language*	World Language*	World Language*	Elective*
4	Social Studies*	Social Studies*	Social Studies*	Social Studies*
5	STEM Academy Honors Algebra II/STEM Academy Honors Physics & space science	STEM Academy Honors Chemistry/Earth Science	AP Calculus or pre-calculus	Advanced Calculus or AP Calculus
6	STEM Academy Honors Algebra II/STEM Academy Honors Physics & space science	Engineering Analysis	STEM Academy Honors Biotechnology	AP Science-Biology, Chemistry, Physics, or Environmental Science
7	Engineering Explorations	STEM Academy English 10	Dual enrollment GIS	Engineering Capstone Project/Internship

8	STEM Academy English 9	Geometry or Pre-calculus or AP Statistics	AP Computer Science or AP Statistics	Dual enrollment Engineering
Co-curricular	Robotics, TSA, TARC, eCybermission, VJAS	Robotics, TSA, TARC, VJAS	Junior Seminar Robotics, TSA, TARC VAS	Senior Seminar Robotics, TSA, TARC, VJAS
*indicates class is not within the Academy				

The freshman courses consist of a team-taught, double-blocked Algebra II/Physics course, Engineering Explorations, and STEM English. The fact that the 24-student cohort at a particular grade is involved in the same four HHS Governor's STEM Academy courses makes integration across the STEM disciplines possible. In the Engineering and Technology pathway, students will frequently work in teams to accomplish assigned tasks. These students also enter research projects into the Virginia Junior Academy of Sciences. In addition to these co-curricular challenges, students are encouraged to participate in extracurricular STEM challenges provided by the HHS FIRST Robotics team, Big Blue 'Botics, and to become actively engaged in the Technology Student Association. In their junior and senior years, students will be working in teams to complete projects in their community. These projects will be part of their dual enrollment GIS course and their Engineering Practicum IV. This variety of experiences mirrors the broad base of coursework preparing the students for a STEM career.

Students in the Engineering and Technology pathway have the opportunity for industry certification either through Pre-Engineering Assessment by NOCTI or the Engineering Technology Examination by SkillsUSA.

Pathway 2: Science and Mathematics

Students in the eighth grade who have a GPA of 3.0 or better may choose to apply to this pathway. Students who apply must agree to the following;

a. sign and submit the Governor's Early College Scholars Agreement
b. successfully complete at least one mathematics and one science class each year
c. be active in extracurricular academic activities that may include, but not be limited to, envirothon, academic competition team, Big Blue 'Botics, Saturday Physics, VJAS, TARC, mu alpha theta, and TSA
d. successfully complete a total of at least three AP or dual enrollment courses in mathematics and science.

Students who complete this level of academic depth and success at Harrisonburg High School are equipped and prepared to move on to further education or training in a STEM-related field. While space in the Engineering and Technology Pathway for the Harrisonburg High School Governor's STEM Academy is limited, the Science and Mathematics Pathway is open to students who meet the requirements and agree to complete the program. Additional STEM electives are planned over time to enhance the Science and Mathematics Pathway. Two that will be implemented in 2013-14 are a dual enrollment GIS course with James Madison University and a dual enrollment biology course with Blue Ridge Community College. Opportunities for certificates exist for Advanced Placement Computer Science A, Certified Internet Web Professional (CIW), Microsoft Office Specialist (MOS), and many more depending on students' course choice. The following table provides suggested plan of courses for a student on the Mathematics and Science Pathway (also see Appendix D).

	Freshman	Sophomore	Junior	Senior
1	Elective	Elective	Elective	Elective
2	Elective	Elective	Elective	Elective
3	World Language	World Language	World Language	Senior Capstone Project or Research or Internship
4	Social Studies	Social Studies	Social Studies	Social Studies
5	Earth Science	Biology	Chemistry	Physics or AP Physics
6	Geometry	Algebra II	Dual enrollment pre-Calculus	AP Calculus
7	English 9	English 10	English 11	AP or DE English
8	Physical Education	Physical Education	AP or DE science or additional Mathematics	AP or DE science or additional Mathematics
Co-curricular	Robotics, TSA, TARC, eCybermission, VJAS	Robotics, TSA, TARC, VJAS	Junior Seminar Robotics, TSA, TARC VAS	Senior Seminar Robotics, TSA, TARC, VJAS

Harrisonburg High School Governor's STEM Academy students on both pathways will share opportunities to participate together on industrial tours, meetings with invited speakers and with certain coursework.

Students graduating from the Harrisonburg High School Governor's STEM Academy will have a strong academic preparation for entering a four-year college majoring in a wide variety of

STEM fields. They will be well-prepared to continue education in any of Virginia's fields of economic growth named by The Virginia Economic Development Partnership, including:

- Food processing
- Clean energy
- Biotechnology/R&D
- Federal security agencies and providers
- Information technology
- Aerospace
- Global logistics.

Requirements for successful program completion

Students enrolled in the Harrisonburg High School Governor's STEM Academy must earn at least nine transferable college credits, (fifteen in the Mathematics and Science Pathway) and must maintain a GPA of 3.0 or better to remain in good standing through their high school years and must have a final GPA of 2.5 or greater to be considered a completer of the program. All students will complete a capstone course integrating knowledge acquired in the Academy. In addition to these requirements, students must pass end-of-course Standards of Learning tests in all applicable classes and students in the Governor's STEM Academy will take and pass either the Pre-Engineering Assessment by NOCTI or the Engineering Technology Examination by SkillsUSA.

Work-based Experience

Students in the HHS STEM Governor's Academy will be immersed in problem- and project-based learning in grades nine through twelve. Several projects and competitions the students can become involved in to promote integration of technology, reading and writing skills, physics, and mathematics are: Team America Rocketry Challenge (TARC), eCybermission, FIRST robotics, and Virginia Junior Academy of Sciences. Each year students will learn about

STEM careers through guest lectures and field experiences. In their senior year students will also gain practical knowledge through research and internships in one of several STEM fields.

Length of Program and Daily Schedule

The Governor's STEM Academy will follow a full-day, academic year calendar and operate within the Harrisonburg High School schedule, which is a block schedule. (See Appendix E - Bell Schedule)

Statement of Assurances

Harrisonburg City Public Schools will be the fiscal agent for the Harrisonburg High School Governor's STEM Academy and assures that operating funds and facilities are available to support the Governor's STEM Academy and are adequate to meet the program's needs. Funds have been allocated to provide support for each level of STEM programming.

Allocated Materials and Equipment

Harrisonburg City Schools will allocate equipment and facilities. Some equipment and materials are already in place for implementation. HCPS supports instructional programs through operating funds, CTE funds, and grant funds such as the Carl D. Perkins Vocational and Technical Education Act. Blue Ridge Community College and JMU campuses will provide facilities and training aids as necessary for the two pathways of the Harrisonburg High School Governor's STEM Academy.

Description of Proposed Program Evaluation

Harrisonburg City Public Schools has established a STEM Advisory Board, which meets four times a year to evaluate the program. Subcommittees to the Advisory Board meet as needed.

HCPS will also annually collect and report data to the Virginia Department of Education related to student achievement, goal achievement and the other indicated areas. The HHS Governor's STEM Academy will hold monthly "town meetings" with all students and faculty to discuss future plans and any problems. Students will also complete an annual evaluation survey.

HCPS will track the successes and failures of our STEM Academy students through the use of student information software. Data for approximately 50 seniors who meet the requirements for the Mathematics and Science Pathway at the conclusion of this school year will help establish a known baseline upon which we hope to build.

Administrative Procedures

Partnerships

Our partners have committed to serving multiple roles of support for our Governor's STEM Academy. We will continue to expand and develop these partnerships as our programs and student population grows. Our business and industry partners have helped us identify the STEM needs of the current work force in our local economy and in surrounding areas. Business/Industry partners such as Blackwell Engineering, The Rockingham Groups, and Rosetta Stone have also pledged to support our job shadowing and internships as the Academy students approach their senior projects and capstone coursework. James Madison University has agreed to provide support with outside evaluation, professional development of key staff, consultation on curriculum development and defining pathway course work. JMU engineering fraternities and sororities have also pledged support as mentors for the Academy students. Blue Ridge Community College (BRCC) will be instrumental in helping to develop our articulation of dual-enrollment courses and initiating the Blue Ridge Scholars program where our students will

work towards their Associate degree while in high school. In the future, BRCC will provide guidance and further support for developing additional pathways for the Academy such as Health Sciences and Mechatronics. Harrisonburg City Schools work with surrounding school divisions through biannual meetings hosted by JMU's STEM Committee to collaborate on future STEM programs.

Student Recruitment, Selection Criteria, and Admissions

In January, Harrisonburg High School Governor's STEM Academy faculty visits every eighth-grade science class to discuss with students the HHS Governor's STEM Academy. Applications are distributed to interested students and additional applications are left with teachers and school counselors. Counselors and eighth-grade mathematics and science teachers are asked to approach and encourage students they believe would benefit from the HHS Governor's STEM Academy. After initial contact is made with the students, an information night is scheduled for interested students and their parents.

Any student who meets the GPA requirement and is willing to agree to the plan of studies, and submits an application will be accepted into the Mathematics and Science Pathway. Agreements required for admission include the Governor's Early College Scholars Agreement, and to successfully complete at least one mathematics and science course per year including a total of three dual enrollment or AP mathematics and science classes. Students' progress, GPA, Standards of Learning scores and participation in extracurricular academic activities will be monitored each school year and students will be notified of their standing.

Students' applications for the Engineering and Technology Pathway include essays regarding interest and a design challenge. HHS Governor's STEM Academy faculty will

evaluate these essays and the students' academic records in middle school and students will be chosen.

Code of Conduct and Attendance

Students are required to adhere to the Harrisonburg City Public Schools Code of Conduct and attendance policy.

Transportation

Harrisonburg City Public Schools will provide transportation for all activities and classes for Harrisonburg High School Governor's STEM Academy students. Transportation will be in compliance with all applicable local, federal, and state policies and regulations.

Staff Recruitment, Selection, and Assignment

All faculty members will hold Virginia teaching licenses. All teachers will hold endorsements in the content taught and meet the standards for highly qualified teachers as set in the federal No Child Left Behind legislation. All teachers of dual enrollment courses will meet the same criteria as faculty teaching a comparable course on the community college campus.

Staff Development

Strategic and successful implementation of programs comes from strategic planning and support for the teachers who are working in these K-12 STEM programs.

The goal with professional development in the elementary schools is to influence instruction so that the intentional teaching of content through the design process becomes a part of the teacher and becomes a natural part of their planning and lesson delivery.

In the elementary schools the professional development associated with I-STEM is delivered in stages. Five enrichment specialists were trained as I-STEM specialist. They participate in several design challenges that focus on the core components of the program. Objectives are set and the pacing guide is consulted. I-STEM lessons are written collaboratively by a team of teachers who pool their talents and abilities to write cohesive, strategy-rich, research-based units that embody the design process. The I-STEM specialists lead the process to ensure consistency, alignment and rigor.

The enrichment specialists then continually provide tiered support throughout the year. As classroom teachers become more comfortable with the curriculum, then the focus shifts to discourse, questioning strategies, incorporating documentation and drawing, grouping students and providing feedback.

The middle school program is focused on Life Science and Physical Science in combination with technology education, therefore these co-teachers work together to train one another on the science or technology content. As an additional resource, training is provided from experts in the field at various points during the school year and the summer that are applicable to the unit of study. As we continue to grow this program and reflect on success and failures, we will identify areas of professional growth needed to sustain the rigor and relevance of the program and seek professional development in these areas.

The Harrisonburg High School Governor's STEM Academy staff development initially focused on content integration and co-teaching. This plan was then discussed with the Governor's STEM Academy English teacher to plan how and what writing and reading would be used to target technical reading and writing skills and the integration of the skills with the science and mathematics. Connections were explored with the technology teacher of the

Engineering Explorations class to determine how projects in that course would integrate with the others. The Governor's STEM Academy faculty also participated in two book studies with other teachers exploring the integration of topics within *The Immortal Life of Henrietta Lacks* and *The Boy Who Harnessed the Wind*.

The science teachers involved in the Academy development attended several sessions on integrative STEM at the Virginia Association of Science Teachers Professional Development Institute. Additionally, the co-directors and teachers of the mathematics and physics courses in the STEM Academy attended the NSTA's first STEM conference in Atlantic City, N.J.

As the program is developed and challenges arise, we are also reaching out to James Madison University's Dr. Bob Kolvoord, who was instrumental in the development of the University's Integrated Science and Technology program, and who has agreed to help facilitate staff development. The Governor's STEM Academy will use Dr. Kolvoord's experience, expertise, and resources in obtaining targeted professional development for the STEM Academy faculty. Governor's STEM Academy teachers will be supported in their professional development as needs are identified.

To meet the goals of providing engaging instruction, support, and intentional programming HCPS STEM programs will provide professional development on pedagogical knowledge of integration, content knowledge of subject areas and curricular knowledge of STEM. Through quality models and examples of the integrated curriculum we hope to influence the use of "purposeful design and inquiry." STEM education asks teachers to understand the connections among subject matter and to teach students how to think (Sanders, 2009).

Professional Development Timeline

Fall 2011-Summer 2013

Participants	Activity or Event	Dates	Status
Personnel involved in STEM programs, advisory committee	Meeting schedule throughout year as needed	Ongoing	Ongoing
5th grade Science teachers, Administrators, STEM Explorations Coordinator and STEM Coordinator	Planning meetings, unit development and hands-on experiences with I-STEM design challenges	Ongoing	Continuous
Enrichment Specialist and K-8 Division STEM Coordinator	Ongoing curriculum development and collaborative meetings	Sept. 2011-2013	Ongoing
STEM Enrichment specialist and STEM Coordinator	I-STEM retreat (30 hours)	August 2011	Complete
All School Personnel at 2 elementary Schools	I-STEM education curriculum components	September-October 2011	Complete
Division K-8 STEM Coordinator and Watermen Elementary School Enrichment Specialist	Children's Engineering Conference	November. 2011	Complete
Division STEM Coordinator, Co-directors HHS Governor's STEM Academy, and Keister Enrichment Specialist	NSTA STEM Symposium and expo	March 2012	Complete
Summer School Teachers	STEM thematic units training	June 2012	Complete
Watermen Elementary School Enrichment Specialist	Engineering Content Teaching Academy JMU	July 2012	Complete
STEM Enrichment specialist and STEM Coordinator	Smart Board Training	August 2012	Complete
All elementary classroom assistants	How to support the students and teachers in STEM Education	August 2012	Complete
STEM Enrichment specialist and STEM Coordinator	Infusing more Mathematics into STEM Curriculum with Mathematics in Focus	August 2012	Complete
All 5 Enrichment Specialist and K-8 Division STEM Coordinator	Weeklong STEM retreat	August 2012	Complete
12 Classroom Teachers Grades K-8	Summer School STEM Planning	Feb. 2012-July 2012	Complete
All School Personnel at 3 elementary Schools	I-STEM education curriculum components	September-October 2012	Complete
STEM Exploration Coordinators, and HHS Governor's STEM Academy science teachers	Virginia Association of Science Teachers	November 2012	Complete

STEM Exploration Coordinator, Technology Education teachers and Division K-8 STEM Coordinator	Sustainability and renewable Energy training	December 2012	Complete
Guidance Counselors	STEM Pathways training	Spring 2013	Pending
Guidance Counselors	Training on Wizard Software	Spring 2013	Pending
HHS Governor's STEM chemistry and Earth science teachers	Integrating Earth science and Chemistry	Summer 2013	Pending
Jeff Oswald	Changes and Innovations in AP Computer Science	Summer 2013 and ongoing	Pending
Division STEM Coordinator and STEM Explorations Coordinator	Waterbotics Training	March 2013	Pending
Division STEM Coordinator and STEM Explorations Coordinator	International Technology Engineering Education Association Conference	March 2013	Pending
STEM Explorations Coordinators and HHS Governor's STEM Academy personnel	Vertical Articulation of program model	March 2013	Pending
I-STEM personnel and Middle school STEM Explorations coordinators	Vertical Articulation of program characteristics	April 2013	Pending

Staff Evaluation

Supervision of the Governor's STEM Academy instructional faculty will be handled according to the policies and procedures set by the School Board of Harrisonburg City Public Schools. Personnel will be hired who meet the Virginia teacher licensure requirements and/or postsecondary faculty qualifications. Where applicable, teachers must have industry-specific education with training and experience, including industry certification. Staff will be evaluated according to the human resources policies of Harrisonburg City Public Schools using the Teacher Performance Goals assessment tool established by the school division.

The co-directors of the Harrisonburg High School Governor's STEM Academy as well as the HHS administrative staff assigned to the teacher's particular department will informally observe Governor's STEM Academy teachers frequently. The secondary STEM coordinator will conduct at least one formal, unannounced observation of at least 30 minutes, with copies given to the HHS principal and the co-directors of the Governor's STEM Academy. Students will also be

asked to evaluate the staff in the Governor's STEM Academy. The formal observation, a narrative written by the co-directors, and the students' evaluations will be combined in equal weights to provide each staff member an evaluation of their performance within the Governor's STEM Academy.

Parent, Student, and Community Involvement

All seventh-grade students will use the Virginia Education Wizard to explore their career and college interests. This personalized exposure to college and career planning, matched with an engaging STEM curriculum, is designed to educate and attract students to the possibility of a STEM career. After the students have received results from the Virginia Education Wizard, the HHS Governor's STEM Academy faculty in conjunction with the HHS guidance department and the middle school guidance departments will host a "course planning for career options" workshop at each of the HCPS middle schools where we will present parents and their seventh- and eighth-grade children with information regarding diplomas, seals and certifications and tools to complete academic and career plans that result in multiple postsecondary pathways.

HCPS has a divisionwide goal to have parents and the community members become partners in our students' education. The STEM Academy encompasses this goal throughout our planning, implementation and reflection process.

The Harrisonburg High School Governor's STEM Academy holds three potluck meetings per year. The first is held the week before school begins when the freshmen are participating in STEM Academy "boot camp," during which they get to know each other, the faculty, and the expectations for the program. The second potluck meeting is held shortly after returning from winter break and the final potluck meeting is held in the spring of the year. These are designed to get parents interacting with each other and to allow for a dialog between faculty and parents to

discuss the program and their children's education. The community is a part of the Governor's STEM Academy: speakers are invited to classes, students are taken on field experiences, and student projects are community based. The first of these community-based projects begins with the ninth-graders' eCybermission and culminates in a capstone project during their senior year.

We recognize that parents and the community are unaware of the full breadth of STEM fields and how STEM education is different. To publicize and highlight the programs and curriculum, and to educate the community about STEM and the possible career paths, Harrisonburg City Public Schools will hold an annual community STEM day.

Budget and Documentation of Insurance

The HHS Governor's STEM Academy operates on an annual budget of $220,350. This budget includes all of the budget reporting categories such as: salaries, materials, professional development, etc. (see Appendix E). Currently, local funds have been allocated for the program. However, it is our intent upon receiving the Governors Academy designation to pursue grants from local, state and national companies, agencies and foundations to assist us in expanding and supporting the Academy programming.

Insurance for all HCPS students attending any programs sponsored by Harrisonburg City Schools will be covered by insurance offered by the Utica Mutual Insurance Company, School Systems of VA Group SI A, and Republic-Franklin Insurance Company. The insurance is a supplemental accidental injury insurance policy which covers students at school, on field experiences, during other school-sponsored activities and on school buses.

Direct Costs HHS Governor's STEM Academy (based on 2012-13 and 2013-14 school years)

1. Personnel

A total of 2 teachers 1/4 time in STEM Academy, 3 teachers 1/6 time in STEM Academy, and 2 co-directors/teachers $97,500

2. Employee Benefits

Benefits for the above employees (includes FICA, Life Insurance, Social Security, Medicare and Health Benefits) $29,250

3. Purchased Services

This includes stipends for any speakers and the in-kind donations from partners for speakers and field experiences.

4. Internal Services

Fees for family night meals and event coordination

5. Staff Development

Provides staff professional memberships and teacher resource books $555.00

6. Summer Component $3250

Pre-school freshman orientation days, Mathematics readiness summer school

7. Travel

Travel will be required for teachers to attend professional development activities and conferences $1850.00

8. Contractual Services

Curriculum writing over the summer $4000.00

9. Materials and supplies

Consumable Materials for design projects

10. Equipment

l laptop per student and teacher

3D printer

cnc router

TARC registration and materials

$55,000.00

11. Facilities $15000

Portion of the yearly operating costs of HHS

A-Direct Costs	**TOTAL**			
	$5,000 Grant State Funds	Perkins Funds	Other Funds (Local or grant funds to be described in the Budget Narrative)	In-Kind
1. Personnel — 1000			97,500	4000
2. Employment Benefits — 2000			29,250	
3. Purchased/Contractual Services — 3000			500	1000
4. Internal Services — 4000			5000	
5. Staff Development — 5000			1000	
6. Summer Component Activities — 5000			3250	
7. Travel — 5000			1850	
8. Contractual Services — 5000			4000	
9. Materials and Supplies — 6000			3000	
10. Equipment — 8000			55,000	
11. Facilities — 8000			15,000	
B — Indirect Costs *				
Total				
*If recovering indirect costs, the rate must not exceed the state-approved indirect cost rate of the fiscal agent.				

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Appendix

Appendix A
Governor's Academy Planning Committee Members

Name	Affiliation	Title
Andy Jackson	Harrisonburg City Public Schools	9-12 STEM Coordinator and 5-12 Science Coordinator
Amy Sabarre	Harrisonburg City Public Schools	PK-8 STEM Coordinator and PK-4 Science Coordinator
Patrick Lintner	Harrisonburg City Public Schools	Executive Director of Instruction
Scott Kizner	Harrisonburg City Public Schools	Superintendent Harrisonburg City Schools
Greg Corder	HCPS: Thomas Harrison Middle School	STEM Explorations Coordinator
Patty Watson	HCPS: Skyline Middle School	STEM Explorations Coordinator
Dominick Swayne	James Madison University	External Relations COE Education Support Center
Geoff Estes	Harrisonburg City Public Schools	Co-Director HHS Governor's STEM Academy
Bob Kolvoord	James Madison University	Interim Director School of Engineering Co-Director for Center for STEM Education Outreach Professor, ISAT: Educational Technology
Bob Young	Blue Ridge Community College	Vice President BRCC

HCPS STEM Advisory Board

Name	*Affiliation*	*Title or Company*
Hans Herlan	HCPS: Skyline Middle School	Tech Education Teacher
Edward Blackwell	Blackwell Engineering	CEO
W. Neal Menefee	Rockingham Group	President: Rockingham Group
Chris Mayfield	James Madison University	Assistant Professor, Computer Science
Bob Kolvoord	James Madison University	Interim Dean of Engineering

Nick Swayne	James Madison University	External Relations COE Education Support Center
Bob Zickifoose	Blue Ridge Community College	Assistant Professor of Machine Engineering Design Technology
Kevin Giovanetti	James Madison University	Professor of Physics
Jeff Oswald	Harrisonburg High School	Mathematics Teacher
David Slykhis	James Madison University	Co-Director of Center for STEM education and Outreach Vice-President fo Society for Information Technology and Teacher Education
R. Bryce Inouye	Rosetta Stone	AI Researcher
Tracy Shaver	Harrisonburg High School	Principal HHS
Joe Glick	Harrisonburg High School	Principal SKMS
Rob Prins	James Madison University	Assistant Professor Department of Engineering
Scott Kizner	HCPS	Superintendent
Anne Loso	HCPS	Mathematics Coordinator K-12
Amy Sabarre	HCPS	PK-8 STEM Coordinator and PK-4 Science Coordinator
Andy Jackson	HCPS	9-12 STEM Coordinator and 5-12 Science Coordinator
Greg Corder	HCPS: Thomas Harrison Middle School	STEM Explorations Coordinator
Patty Watson	HCPS: Skyline Middle School	STEM Explorations Coordinator
William Stansberry	HCPS: Thomas Harrison Middle School	Technology Education Teacher
Patrick Lintner	HCPS	Executive Director of Instruction
Callie Johnson Miller	PhD student University of Pittsburg, former HHS student	PhD Graduate Student in Bioengineering
Emily Mae Cummings	James Madison University SWE	Co-President of Society of Women Engineers
Doranda Bailey		Engineer
Mike Cardman		Engineer
Paulina Hoang	James Madison University SWE	Co-President of Society of Women Engineers
Seth Stratford	HCPS: Harrisonburg High School	CTE teacher

Shelia Antonnicola	HCPS: Harrisonburg High School	STEM English Teacher 9 Honors and 10 Honors
Geoff Estes	HCPS: Harrisonburg High School	STEM academy teacher
Karen Campbell	HCPS	Director of Technology
Don Vale	HCPS: Thomas Harrison Middle School	Principal
Daniel Kirawin	HCPS: Thomas Harrison Middle School	Assistant Principal
John Coffey	Shenandoah Valley Electric Cooperative	VP Engineering Operations
Tracy Shaver	HCPS: Harrisonburg High School	Principal

Appendix B:

Memorandum of Agreement from each Partner

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1. Identify the needs of the engineering, science, and technology community in Harrisonburg and surrounding areas.
2. Provide guidance in the development of curriculum and course offerings.
3. Provide opportunities for job shadowing and internships when appropriate for students.
4. Provide opportunities for site visits and other enhancement activities to promote STEM and encourage students' pursuit of higher education.
5. Assist in the internal evaluation process of the program.

By signing this agreement, I am a willing participant and supporter in the establishment of the Harrisonburg High School STEM Academy and the STEM Explorations Academy at Skyline Middle School.

Bob Zickefoose

Partner Name:
Title: Assistant Professor & Mech. Eng Design Technology. Blue Ridge Community College

Feb 23, 2012
Date

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Partner Name: Rick Swayne
Title: JMU External Relations COE Education Support Center

23 Feb 12
Date

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_____Donald Vale_____ __10 / 30/ 2012_
Partner Name: Date
Title: Principal
Thomas Harrison Middle School

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Partner Name: Patricia Watson
Title: SKMS STEM Coordinator

10/9/12
Date

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Partner Name: Seth Strickland

Title:

10/29/12
Date

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Partner Name:
Title:

10/31/2012
Date

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Partner Name: David A. Strickland

Title: Assoc. Prof. of Science Education, JMU
Co-Director center for STEAM Education + Outreach, JMU
Vice-President of Society for Information Technology + Teacher Education (SITE)
Director Content Teaching Academy, JMU

2/23/12
Date

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Michael Cardman

October 9, 2012

Partner Name: Michael Cardman
Title:

Date

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John A. Coffey, III — October 19, 2012

Partner Name: Shenandoah Valley Electric Cooperative (Date)

Title: VP Engineering & Operations

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Gregory W. Carter

Partner Name:

Title: Stem Coord at THMS

10/31/12

Date

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__Emily Mae Cummings_____ __8/28/2012_____
Partner Name: Date
Title:

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By signing this agreement, I am a willing participant and supporter in the establishment of the Harrisonburg High School STEM Academy and the STEM Explorations Academy at Skyline Middle School.

Partner Name:
Title:CO-Director HHS STEM Academy

10/30/12
Date

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Partner Name: Kevin Gammetti
Title: Ret. Physics JMU

Feb 23 2012
Date

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Skyline Middle School and Thomas Harrison Middle School

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2. Provide guidance in the development of curriculum and course offerings.
3. Provide opportunities for job shadowing and internships when appropriate for students.
4. Provide opportunities for site visits and other enhancement activities to promote STEM and encourage students' pursuit of higher education.
5. Assist in the internal evaluation process of the program.

By signing this agreement, I am a willing participant and supporter in the establishment of the Harrisonburg High School STEM Academy and the STEM Explorations Academy at Skyline Middle School.

Joseph D. Lee, Jr.
Partner Name:

Oct. 31, 2012
Date

Principal, Skyline Middle School
Title:

HARRISONBURG CITY
Public Schools

One Court Square • Harrisonburg, VA 22801
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HANS HERLUP

Partner Name:

Title: SKYLINE TECH. ED. TEACHER

FEBRUARY 2012

Date

HARRISONBURG CITY
Public Schools

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Paulina Hoang — 10/21/12

Partner Name: — Date
Title:

HARRISONBURG CITY
Public Schools

One Court Square • Harrisonburg, VA 22801
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Partner Name: R. Bryce Inouye
Title: AI Researcher
Rosetta Stone Labs

2/23/2012
Date

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Public Schools

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By signing this agreement, I am a willing participant and supporter in the establishment of the Harrisonburg High School STEM Academy and the STEM Explorations Academy at Skyline Middle School.

Partner Name:

Title: Secondary Science Coordinator
HHS STEM Academy Director

10/30/12
Date

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Public Schools

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Daniel Kirwan

10/25/12

Partner Name: Daniel Kirwan
Date

Title: Assistant Principal, Thomas Harrison Middle School

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Public Schools

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Partner Name: _____ Date: 10/31/12

Title: Superintendent

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Bob Kolvoord BK

Partner Name:

23 Feb '12

Date

Title: Interim Director,
School of Engineering
Co-Director, Center for STEM Education & Outreach
Professor, ISAT & Education Technology

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Patrick Santo
Partner Name:

10/30/2012
Date

Exec. Director of Instruction
Title:

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Public Schools

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Anne E Dove
Partner Name:
Title:

October 2012
Date

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Public Schools

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Partner Name: Chaistopher S. Mayfield
Title: Assistant Professor, Computer Science
mayfiecs@jmu.edu

02/23/12
Date

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Public Schools

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W Neal Menefee
Partner Name: W. NEAL MENEFEE
Title: PRESIDENT - ROCKINGHAM GROUP

2-23-2012
Date

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Public Schools

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Callie Miller
Partner Name: Callie Miller
Title: Graduate Student Researcher
PhD in progress, Bioengineering
University of Pittsburgh

10/18/12
Date

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Public Schools

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Jeff Oswald

JEFF OSWALD
Partner Name:

2/23/12
Date

Title: MATH TEACHER HHS

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Public Schools

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Partner Name: Robert Pring
Title: Assistant Professor
Department of Engineering
James Madison University

10/19/2012
Date

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Public Schools

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Amy E Sabine
Partner Name:
Title:

10-25-12
Date

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Public Schools

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Tracy Shaver
Partner Name:

10/12/12
Date

Title: Principal

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Public Schools

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Karen Campbell
Partner Name:
Title: Director of Technology

10/11/12
Date

HARRISONBURG CITY
Public Schools

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Partner Name: Deronde Bailey
Title: —

10/24/12
Date

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Public Schools

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Partner Name: [illegible]
Title: [illegible]

2/23/12
Date

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Sheila Antonnicola — October 18, 2012

Partner Name: Harrisonburg High School — Date
Title: STEM English Teacher 9 Honors and 10 Honors

Appendix C: Certificate of Insurance

Client#: 636037 43HARRICIT1

ACORD **CERTIFICATE OF LIABILITY INSURANCE**

DATE (MM/DD/YYYY) 01/25/2013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
BB&T - Shomo & Lineweaver 328 S. Main Street PO Box 929 Harrisonburg, VA 22801	PHONE (A/C, No, Ext): 540 437-1300	FAX (A/C, No): 8887468791
	E-MAIL ADDRESS:	

INSURED	INSURER(S) AFFORDING COVERAGE	NAIC #
Harrisonburg City Public Schools One Court Square Harrisonburg, VA 22801	INSURER A : Utica Mutual Insurance Company	25976
	INSURER B : School Systems of VA Group SI A	WCSIF
	INSURER C : Republic-Franklin Insurance Com	12475
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY			CPP1397426	07/01/2012	07/01/2013	EACH OCCURRENCE	$1,000,000
	X COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	$300,000
	CLAIMS-MADE X OCCUR						MED EXP (Any one person)	$5,000
							PERSONAL & ADV INJURY	$1,000,000
							GENERAL AGGREGATE	$3,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	$3,000,000
	POLICY PRO-JECT LOC							$
C	AUTOMOBILE LIABILITY			BAC1394333	07/01/2012	07/01/2013	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	ALL OWNED AUTOS / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS / X NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$
								$
A	X UMBRELLA LIAB X OCCUR			CULP1567547	07/01/2012	07/01/2013	EACH OCCURRENCE	$10,000,000
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$10,000,000
	DED X RETENTION $10000							$
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N			626039	07/01/2012	07/01/2013	X WC STATU-TORY LIMITS / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N	N/A					E.L. EACH ACCIDENT	$1,000,000
	(Mandatory in NH)						E.L. DISEASE - EA EMPLOYEE	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - POLICY LIMIT	$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER

Virginia Department of Education
101 North 14th St
Richmond, VA 23219

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Thomas A. Bairsto

ACORD 25 (2010/05) 1 of 1 The ACORD name and logo are registered marks of ACORD
#S9863832/M9863831 JPW

CareerClusters™ PATHWAYS TO COLLEGE & CAREER READINESS
Science, Technology, Engineering & Mathematics

Commonwealth of Virginia Plan of Study

Rev: 6/12

Student Name: HHS STEM Academy Student
School: HCPS
Date: _____

Cluster: Science, Technology, Engineering and Mathematics **Pathway:** Engineering and Technology

This Career Pathway Plan of Study can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.

EDUCATION LEVELS	GRADE	English/Language Arts	Mathematicsematics	Science	Social Studies/ Science	Recommended Electives *Use state course titles*	Recommended Career and Technical Courses Source: Administrative Planning Guide http://www.cteresource.org/apg/	SAMPLE – Occupations Relating to This Pathway: http://www.doe.virginia.gov/instruction/career_technical/career_clusters/sample_plans_study/index.shtml http://www.careerclusters.org http://www.cteresource.org/cpg/
		NOTE: Indicate State Course Titles and Codes						
Graduation Requirements: http://www.doe.virginia.gov/instruction/graduation/index.shtml								
MIDDLE	7	English 7 (1110)	Mathematics 8/Pre-Algebra (3112)	Life Science (4115)	U S History (2354)		Introduction to Technology (8483)	Engineer Anthropologist Astronomer Geologist Chemist Biologist Physicist Cartographer Blood Bank Technologist Oceanographer Technical Writer Clinical Dietician Meteorologist Nurse Doctor Mathematicsematician
	8	English 8 (1120)	Algebra I (3130)	Physical Science (4125)	Civics & Economics (2357)		Technology Foundations (8403)	
Career Assessment: Identify an appropriate career assessment instrument at the middle school level used to help students and their parents plan for high school: VA Wizard ☒ or other assessment (please indicate): _____								
SECONDARY	9	STEM English (1130)	Algebra II (3135))	Physics (4510)	World History/ Geography I (2215)	Economics & Personal Finance (6120) Health & PE (2 years) Foreign Language (4 years) Other Electives to Complement Pathway (Core Academic and CTE): AP Biology (4370) AP Environmental Science (4270) AP Chemistry (4470) AP Physics (4570) AP Statistics (3192) Intro to computer science **AP Computer Science** (3185)	Engineering Explorations (8450)	
	10	STEM English (1140)	**Geometry (3143)/or AP Statistics (3192)**	Earth Sciences (4210)/ Chemistry (4410)	World History/ Geography II (2216)		Engineering Analysis and Applications II (8451)	
	11	English (1150)	**Trigonometry/ Advanced Algebra (3137)**	Biology (4310)	US/VA History (2360)		Dual enrollment GIS	
	12	English (1160)	**AP Calculus (3177) Or DE Calculus**	**AP Science**	US/VA Government(2440)		Dual enrollment Engineering Engineering Capstone Project/Internship(8452)	
	High school courses in the pathway offered locally for college credit should be coded: Advanced Placement (AP), International Baccalaureate (IB), Dual Enrollment (DE), and/or VC (Validated Credit)							

Highlighted courses are part of the HHS STEM Academy and are required.
Represents courses that are team-taught to enhance integration.

Bold represents courses not restricted to HHS STEM Academy students, but required of STEM Academy students.

Additional Learning Opportunities:
CTSO Organization(s): ☐ DECA ☐ FBLA ☐ FCCLA ☐ FFA ☐ FEA ☐ HOSA ☐ SkillsUSA ☒ TSA

Work-Based Learning:
☒ Career Research ☐ Cooperative Education ☒ Internship ☒ Mentorship ☒ Job Shadowing ☒ Service Learning Project ☐ Student Apprenticeship

POSTSECONDARY	SAMPLE POSTSECONDARY PROGRAMS RELATED TO THIS CAREER PATHWAY Individual plans must include locally agreed upon courses at the postsecondary level (See page 2)			
	Pathway	**Associate Degree, College Certificate, or Apprenticeship**	**Bachelor's Degree**	**Postgraduate Degree**
	Engineering and Technology	**Associate of Science Degree – specialization engineering**	Transferrable to a number of state colleges	(Determined Locally – Optional)

College: Blue Ridge Community College **School Division(s):** Harrisonburg City Public Schools

Postsecondary: Placement Assessments such as Virginia Placement Test or COMPASS	College entrance exams such as ACT & SAT

POSTSECONDARY - COMMUNITY COLLEGE or APPRENTICESHIP - Determined Locally	Semester	English	Mathematicsematics	Science	Social Studies	Required Courses or Recommended Electives			
	POSTSECONDARY PLAN OF STUDIES MUST INCLUDE POSTSECONDARY ACADEMIC, CTE, AND OTHER ELECTIVE COURSES APPROPRIATE FOR AN ASSOCIATE DEGREE.								
	Year 1 1st Semester	College Composition I (ENG 111)	Calculus with Analytic Geometry (MTH 173)	General Chemistry 111	HIS 121 United States History I	SDV 100 College Success Skills	ENGR 120 Introduction to Engineering		
	Year 1 2nd Semester	College Composition II (ENG 112)	Calculus with Analytic Geometry II (MTH 174)	Chemistry 112	HIS 122 United States History II	CSC 200 Introduction to Computer Science	ENGR 140 Engineering Mechanics - Statics		
	Year 2 1st Semester	ENG 251 Survey of World Literature I	Vector calculus (MTH 277)	Physics 241		CST 110 Introduction to Speech Communication	Health & PE	EGR 115	
	Year 2 2nd Semester	ENG 252 Survey of World Literature I	MTH 291 Ordinary Differential Equations MTH 177 Linear Algebra	Physics 242			ENGR 245 Engineering Mechanics - Dynamics	EGR 126, EGR 206	
	College courses offered locally in the high school for college credit should be coded: DE (Dual Enrollment) and/or VC (Validated Credit)								

Related Industry Certifications Available:

Additional Suggested Learning Opportunities:

Work-Based Learning:

☐ Cooperative Education ☐ Internship ☐ Mentorship
☐ Job Shadowing ☐ Service Learning Project ☐ Registered Apprenticeship

UNIVERSITY	
	University/College: Blue Ridge Community College Degree or Major: **Associate of Science Degree – specialization engineering** Number of Articulated CC Credits: 60-63
Notes:	

POSTSECONDARY	**SAMPLE POSTSECONDARY PROGRAMS RELATED TO THIS CAREER PATHWAY** Individual plans must include locally agreed upon courses at the postsecondary level (See page 2)			
	Pathway	**Associate Degree, College Certificate, or Apprenticeship**	**Bachelor's Degree**	**Postgraduate Degree**
	Engineering and Technology		BS Engineering	(Determined Locally – Optional)

College: James Madison University_____ **School Division(s):** Harrisonburg City Public Schools

Postsecondary: Placement Assessments such as Virginia Placement Test or COMPASS	College entrance exams such as ACT & SAT

POSTSECONDARY - COMMUNITY COLLEGE or APPRENTICESHIP - Determined Locally	**Semester**	**English**	**Mathematicsematics**	**Science**	**Social Studies**	**Required Courses or Recommended Electives**			
	POSTSECONDARY PLAN OF STUDIES MUST INCLUDE POSTSECONDARY ACADEMIC, CTE, AND OTHER ELECTIVE COURSES APPROPRIATE FOR AN ASSOCIATE DEGREE.								
	Year 1 1st Semester	General Ed.	Mathematics 235 - calculus	Physics 240/240 L			ENGR 112 Introduction to Engineering		
	Year 1 2nd Semester	General Ed	Mathematics 236 Calculus II	Physics 250/ 250 L	General Ed.				
	Year 2 1st Semester	General Ed.	Mathematics 237 Calculus III	Chem 133E/133L	General Ed.	ENGR 231 Engineering design I			

	Year 2 2nd Semester		Mathematics 238 Linear algebra & Differential equations	Bio 222 or Geol 210		ENGR 232 Engineering Design II	ENGR 221 Engineering Management I	ENGR 212- Statics & dynamics	

College courses offered locally in the high school for college credit should be coded: DE (Dual Enrollment) and/or VC (Validated Credit)

Related Industry Certifications Available:	**Additional Suggested Learning Opportunities:** **Work-Based Learning:** ☐ Cooperative Education ☐ Internship ☐ Mentorship ☐ Job Shadowing ☐ Service Learning Project ☐ Registered Apprenticeship

UNIVERSITY

University/College: James Madison University
Degree or Major: BS Engineering
Number of Articulated CC Credits:

Notes:

CareerClusters™ PATHWAYS TO COLLEGE & CAREER READINESS
Science, Technology, Engineering & Mathematics

Commonwealth of Virginia Plan of Study

Student Name: Science and Mathematics Pathway Student
School: HCPS
Date: _____

Cluster: Science, Technology, Engineering and Mathematics **Pathway:** Science and Mathematics

This Career Pathway Plan of Study can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.

EDUCATION LEVELS	GRADE	English/Language Arts	Mathematicsematics	Science	Social Studies/ Science	Recommended Electives *Use state course titles*	Recommended Career and Technical Courses Source: Administrative Planning Guide http://www.cteresource.org/apg/	SAMPLE – Occupations Relating to This Pathway: http://www.doe.virginia.gov/instruction/career_technical/career_clusters/sample_plans_study/index.shtml http://www.careerclusters.org http://www.cteresource.org/cpg/
		NOTE: Indicate State Course Titles and Codes						
		Graduation Requirements: http://www.doe.virginia.gov/instruction/graduation/index.shtml						
	7	English 7 (1110)	Mathematics 7 (3111)	Life Science (4115)	U S History (2354)		Keyboarding (6150)	Anthropologist Astronomer Geologist Chemist Biologist Physicist Cartographer Blood Bank Technologist Oceanographer Technical Writer Clinical Dietician Meteorologist Nurse Doctor Mathematicsematician Engineer
	8	English 8 (1120)	Mathematics 8/Pre-Algebra (3112)	Physical Science (4125)	Civics & Economics (2357)		IT Fundamentals (6670) Digital Input Technologies (6161/6160)	
	Career Assessment: Identify an appropriate career assessment instrument at the middle school level used to help students and their parents plan for high school: VA Wizard ☒ or other assessment (please indicate): _____							
	9	English (1130)	Algebra I (3130)	Earth Sciences (4210)	World History/ Geography I (2215)	Economics & Personal Finance (6120) Health & PE (2 years) Foreign Language (4 years) Other Electives to Complement Pathway (Core Academic and CTE): Biology II—Ecology (4340) Biology II— Anatomy & Physiology- Survey of Biology Topics (4320) AP Biology (4370) AP Environmental Science (4270) AP Calculus (3177) AP Chemistry (4470) AP Physics (4570) AP Statistics (3192) Intro to computer science AP Computer Science	Technology Foundations (8403/8402)	
	10	English (1140)	Geometry (3143)	Biology (4310)	World History/ Geography II (2216)		Computer Information Systems (CIS)	
	11	English (1150)	Algebra II (3135)	Chemistry (4410)	US/VA History (2360)		Dual enrollment Computer Information Systemns Technology Transfer (8405)	
	12	English (1160)	Trigonometry/ Advanced Algebra (3137)	Physics (4510) or a science course from the recommended electives in science	US/VA Government(2440)		Technology Transfer (8405) Advanced Computer Information Systems	
	High school courses in the pathway offered locally for college credit should be coded: Advanced Placement (AP), International Baccalaureate (IB), Dual Enrollment (DE), and/or VC (Validated Credit)							

For this pathway a student must be in at least one science and one Mathematics course each year of high school. The student must maintain a 2.5 or better GPA and by the end of the senior year must have successfully completed a total of at least 3 Mathematics and science AP or DE courses and have earned 15 or more transferable college credits and signed and met the requirements for the Governor's Early College Scholars Agreement.

Additional Learning Opportunities:
CTSO Organization(s): ☒DECA ☒ FBLA ☒ FCCLA ☐ FFA
☐ FEA ☐ HOSA ☐ SkillsUSA ☒ TSA

Work-Based Learning:
☒ Career Research ☐ Cooperative Education ☒ Internship ☒ Mentorship
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POSTSECONDARY	SAMPLE POSTSECONDARY PROGRAMS RELATED TO THIS CAREER PATHWAY Individual plans must include locally agreed upon courses at the postsecondary level (See page 2)			
	Pathway	**Associate Degree, College Certificate, or Apprenticeship**	**Bachelor's Degree**	**Postgraduate Degree**
	Science and Mathematics	**Associate of Science Degree**	Transferrable to a number of state colleges	(Determined Locally – Optional)

College: Blue Ridge Community College **School Division(s):** Harrisonburg City Public Schools

Postsecondary: Placement Assessments such as Virginia Placement Test or COMPASS	College entrance exams such as ACT & SAT

POSTSECONDARY - COMMUNITY COLLEGE or APPRENTICESHIP - Determined Locally	Semester	English	Mathematicsematics	Science	Social Studies	Required Courses or Recommended Electives			
	POSTSECONDARY PLAN OF STUDIES MUST INCLUDE POSTSECONDARY ACADEMIC, CTE, AND OTHER ELECTIVE COURSES APPROPRIATE FOR AN ASSOCIATE DEGREE.								
	Year 1 1st Semester	College Composition I (ENG 111)	Calculus with Analytic Geometry (MTH 173)	General Chemistry 111	HIS 121 United States History I	SDV 100 College Success Skills			
	Year 1 2nd Semester	College Composition II (ENG 112)	Calculus with Analytic Geometry II (MTH 174)	Chemistry 112	HIS 122 United States History II	CSC 200 Introduction to Computer Science	Health & PE		
	Year 2 1st Semester	ENG 251 Survey of World Literature I	(MTH 277)	BIO 101 or Physics 201		CST 110 Introduction to Speech Communication			
	Year 2 2nd Semester	ENG 252 Survey of World Literature I	MTH 279 or 291	BIO 102 or Physics 202					
	College courses offered locally in the high school for college credit should be coded: DE (Dual Enrollment) and/or VC (Validated Credit)								

Related Industry Certifications Available:	**Additional Suggested Learning Opportunities:** **Work-Based Learning:** ☐ Cooperative Education ☐ Internship ☐ Mentorship ☐ Job Shadowing ☐ Service Learning Project ☐ Registered Apprenticeship

UNIVERSITY	University/College: Degree or Major: Number of Articulated CC Credits:
Notes:	

Appendix E:

BELL SCHEDULE

7:45-9:17 Block I (92 min.)

9:17 (9:22) 9:23 Class Change (6min.) (9:23 Warning Bell)

9:23-10:58 Block II (95 min.)-Homeroom/Announcements

10:58 (11:02) 11:03 Class Change (5 min.) (11:02 Warning Bell)

11:03-1:00 Block III (117 minutes)

First Lunch

11:00-11:26 Lunch I (26 min.)

11:26-11:29 Class Change (3 min.)

11:29-1:00 Block III Class (91 min.)

Second Lunch

11:03-11:33 Block III (30 min.)

11:33-11:58 Lunch II (25 min.)

11:58-12:01 Class Change (3 min.)

12:01-1:00 Block III (59 min.)

Third Lunch

11:03-12:34 Block III (91 min.)

12:34-1:00 Lunch III (26 min.)

1:00(1:04) 1:05 Class Change (5 min.) (1:04 Warning Bell)

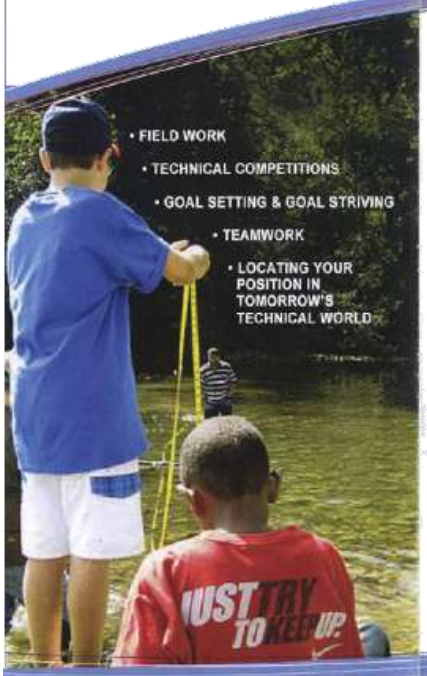
1:05-2:35 Block IV (90 min.)

2:45-4:00 Academic Academy

Appendix F: Promotional Materials

HHS STEM Academy

PREPARING STUDENTS FOR TODAY'S STEM CAREERS AND FOR THOSE YET TO BE CREATED



WHAT IS THE HHS STEM ACADEMY?

The HHS STEM Academy inspires and educates a diverse group of students by engaging them in authentic experiences in mathematics, science, and engineering that enlighten and motivate. Problem based learning is at the heart of the program. Students are encouraged to create and engineer in a variety of areas while becoming part of a rich 21st century learning community that uses technology confidently, works in groups effectively, communicates articulately, and embraces real world problem solving. Students learn in the classroom and in the field to develop confidence as they prepare to be researchers, innovators, engineers and leaders.

WHO IS AN HHS STEM ACADEMY STUDENT?

The HHS STEM Academy is designed for students who have interest and aptitude in applied science and mathematics. Twenty-four students are chosen from the pool of applicants entering HHS as ninth graders. These students work hard as individuals as well as highly functioning teams in the HHS STEM Academy but also are fully engaged members of the student body of HHS. Academy students take some classes together and are integrated into HHS as a whole for others. HHS STEM Academy students graduate having participated as members of academic teams, obtained advanced technical skills, and earned multiple hours of college credit.

HARRISONBURG CITY Public Schools

A Place Where Learning Has No Limits
and
Together We Work for the Success of All

PROBLEM BASED

HHS STEM Academy students obtain and apply their content knowledge through projects and real world problems.

EXPERIENTIAL IN NATURE

HHS STEM Academy students and faculty participate together in projects and experiences where the outcomes and lessons to be learned are not always known beforehand. Students and faculty grow together through reflection on both successes and failures and both are valued.

EMBRACING THE 5 C'S

Competency, Collaboration, Communication, Critical and Creative Thinking are guiding principles of all HHS STEM Academy assignments, projects, and homework.

HHS STEM Academy:

- Supporting students in challenging work
- Building strong technical and academic foundations
- Engaging students through experiential education
- Challenging students with integrated curriculum
- Preparing students for careers of today and the future

Scan this to access HHS STEM Academy web site for more information and application.

http://web.harrisonburg.k12.va.us/hhs_stem

HHS STEM Academy Directors

Mr. Andrew Jackson
ajackson@harrisonburg.k12.va.us

Mr. Geoffary Estes
gestes@harrisonburg.k12.va.us

HHS
STEM ACADEMY
Science Technology Engineering Mathematics

Harrisonburg High School's STEM Academy educates a diverse group of students with a variety of interests, strengths, and backgrounds, to be academic and technical leaders in the 21st century. We accomplish this goal by providing:

- An opportunity to take advanced classes in math, science, and engineering.
- Constant utilization of integrated computer skills.
- Design projects requiring application of knowledge, skills, teamwork, and communication.
- Field experience for making connections between class work and the work environment.
- Information to make an informed decision on their future educational and career plans.

HHS STEM Academy
Harrisonburg High School
1001 Garbers Church Road
Harrisonburg, VA 22801

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