CENTER FOR ENGINEERING Governor's STEM Academy
Burton Center for Arts & Technology
Roanoke County Public Schools

The Center for Engineering (Governor's STEM Academy), located on the campus of the Burton Center for Arts and Technology in Salem, Virginia represents part of the Roanoke County Public Schools' exciting, progressive 'specialty school' concept aimed at highly talented and motivated students.

Students who are interested in engineering and related technical fields apply for admission to this academically rigorous high school program during the spring of their eighth-grade year. Once admitted, the student begins a four year journey into the fields of engineering, architecture and other related fields. They are exposed to both the academic and applied concepts of engineering fundamentals, various blended fields of engineering, as well as a focus on the practical design based problem solving approach.

Each student takes both Engineering and Math classes during the first two years of study, and then adds advanced Chemistry and advanced Physics in their junior year. The first two years of Engineering includes units in Engineering Fundamentals, Mechanics, Electrical Theory as well as Mechatronics, programming and mechanical drawing. Concepts normally not discovered until college freshman engineering courses are routinely explored and learned during this time. Projects are routinely worked into the curricula that help enhance and complement the academic learning process. The students use their own school-supplied laptops to complete several guided design projects and develop their professional communication skills. With access to a precision machine shop and 3-D prototyping technology, the students also gain valuable hands-on experience not found in the traditional classroom.

During the junior year, each student takes a dual-enrollment Engineering Methods course, which is comparable to many universities' freshman engineering courses. Also, all students must take Advanced Chemistry, Physics and AP Calculus. The dual-enrollment course again emphasizes college-level engineering principles, introduces object-oriented programming technology (MATLab and Labview) and team-oriented projects.

Finally, during the senior year, in addition to Advanced Calculus, students take Engineering Mechanics-based Design and Engineering Economy for one block of time, and then take Engineering Research (professional development) and Engineering Internship in a second block of time. In Engineering Research students develop communication skills (verbal presentation and writing technical papers). This work leads into the internship which provides each student with exposure and training in an engineering or science real-world work environment at a local firm. This experience culminates in a project report or paper with a topic usually chosen with the mentor, and related to work being done during the internship. This paper or report is presented in a formal design presentation to a panel of engineers and educators in the spring, before graduation.

Throughout the four-year curriculum plan, emphasis is placed on problem solving skills, critical thinking skills and both analytical and open-ended design processes. Problem solving is intertwined with communication techniques, including use of the engineering method to communicate through technical journals and solution presentation. Team work is also an important element of the program, with the students learning through practice, various aspects of teamwork during design and implementation.

Upon graduation from the Center, students are well-equipped with the knowledge and experience to take them into any college or university engineering program or any STEM discipline. Students who dual enroll to receive college credits are eligible to receive 21 college credits through the Virginia Western Community College (VWCC) that are transferrable to Virginia Tech (VT) through the Articulation Agreement between VWCC and VT. For these courses we follow the curriculum and syllabus established by VWCC (as approved by VT). Pre-AP Pre-Calculus, AP Calculus (AB) and AP Calculus (BC) carry 13 college credits, and, Engineering Methods, and Engineering Economy carry 8 credits.

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