XLR8- Lynchburg Regional Governor's STEM Academy

Profile and Information Sheet

XLR8: Lynchburg Regional Governor's STEM Academy – is the 16th regional Governor's STEM Academy offering programs in science, technology, engineering and mathematics (subjects known collectively as "STEM") for High School juniors and seniors in Virginia's Region 2000/Lynchburg regional area. Located on the campus of Central Virginia Community College – XLR8 offers academic and technical training related to careers in engineering, mechatronics, biotechnology, health science and cybersecurity.

STEM Academy students take courses in math, science and engineering using the Project Lead the Way (PLTW) curriculum. Project Lead the Way (PLTW), is the leading provider of rigorous and innovative STEM (science, technology, engineering and math) education curricular used in schools.

The PLTW curriculum has been designed to promote critical thinking, creativity, innovation and real-world problem solving skills for students. The hands-on, project-based program engages students on multiple levels, and provides them with a foundation and proven path to college and career readiness.

STEM Academy Course Sequences & Course Descriptions

Junior Year -Mechatronics/Biotechnology/Health
- Intro to Engineering Design
- Principles of Engineering
- Statistical Reasoning
- Precalculus I or Applied Calculus I
- College Chemistry for Engineers
- Student Success Skills

Senior Year– Mechatronics
- Blueprint Reading
- Industrial Safety-OSHA 10
- Digital Electronics
- Applied Calculus I & Precalculus II or Calculus I & II
- College Physics
- Internship

Senior Year-Biotechnology
- Medical Terminology I
- Digital Electronics
- Applied Calculus I & Precalculus II or Calculus I & III
- Human Anatomy and Physiology
- Internship

Senior Year-Health Science
- Medical Terminology I
- Principles of Psychology or Developmental Psychology
- Applied Calculus I & Precalculus II or Calculus I & III
- Human Anatomy and Physiology
- Internship

Junior Year -Cybersecurity
- Intro to Computer Applications and Concepts
- Intro to Network Concepts
- Software Design
- Network Security Basics
- Statistical Reasoning
- Precalculus I or Applied Calculus I
- Student Success Skills

Senior Year–Cybersecurity
- Network Attacks, Computer Crime and Hacking
- Legal Topics in Network Security
- Applied Calculus I & Precalculus II or Calculus I & II
- College Physics
- Internship

JUNIOR YEAR COURSES

XLR8 APPLIED CALCULUS I

Students in this semester course learn about limits, continuity, differentiation of algebraic and transcendental functions with applications, and an introduction to integration. Prerequisite: Pre-Calculus I (3 DE credits)

XLR8 COLLEGE CHEMISTRY FOR ENGINEERS I & II

This one year sequence of courses emphasizes experimental and theoretical aspects of inorganic, organic, and biological chemistry. Discusses general chemistry concepts as they apply to issues within our society and environment. Course examines principles and concepts of chemistry with an emphasis on applications useful to engineers. Includes stoichiometry; atomic structure; chemical equations and reactions; chemical bonding and molecular structure, gases, liquids, and solids; materials science; chemical thermodynamics; kinetics: equilibrium; electro-chemistry; and polymers. (8 DE Credits)

XLR8 COLLEGE SUCCESS SKILLS

Assists students in transition to colleges. Provides overviews of college policies, procedures, and curricular offerings. Encourages contacts with other students and staff. Assists students toward college success through information regarding effective study habits, career and academic planning, and other college resources available to students. Includes instruction in networked information resources and in the use of telecommunication software (1 DE Credit)

XLR8 INTRODUCTION TO COMPUTER APPLICATIONS & CONCEPTS

Covers computer concepts and internet skills, and uses a software suite which includes word processing, spreadsheet, database, and presentation software to demonstrate skills. Recommended prerequisite keyboarding skills. (3 DE credits)

XLR8 INTRODUCTION TO ENGINEERING DESIGN (PLTW)

In this course, students use 3D solid modeling design software to help them design solutions to solve proposed problems. Students will learn how to document their work and communicate solutions to peers and members of the professional community. The major focus of the IED course is to expose students to the design process, research and analysis, teamwork, communication methods, global and human impacts, engineering standards and technical documentation. (4 DE credits)

XLR8 INTRODUCTION TO NETWORK CONCEPTS

Provides instruction in networking media, physical and logical topologies, common networking standards and popular networking protocols. Emphasizes the TCP/IP protocol suite and related IP addressing schemes, including CIDR. Includes selected topics in network implementation, support and LAN/WAN connectivity. (3 DE credits)

XLR8 NETWORK SECURITY BASICS

Provides instruction in the basics of network security in depth. Includes security objectives, security architecture, security models and security layers; risk management, network security policy, and security training. Includes the five security keys, confidentiality integrity, availability, accountability and auditability. (3 DE credits)

XLR8 PRE-CALCULUS I

Students in this semester course learn about college algebra, matrices, and algebraic, exponential, and logarithmic functions. (3 DE credits)

XLR8 PRINCIPLES OF ENGINEERING (PLTW)

This survey course of engineering exposes students to some of the major concepts they'll encounter in a post-secondary engineering course of study. Students have an opportunity to investigate engineering and high-tech careers and to develop skills and understanding of course concepts. Students employ engineering and scientific concepts in the solution of engineering design problems. They develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students also learn how to document their work and communicate their solutions to peers and members of the professional community. (4 DE credits)

XLR8 SOFTWARE DESIGN

Introduces principles and practices of software development. Includes instruction in critical thinking, problem solving skills, and essential programming logic in structured and object-oriented design using contemporary tools. (3 DE credits)

XLR8 STATISTICAL REASONING

Students will learn elementary statistical methods and concepts including descriptive statistics, estimation, hypothesis testing, linear regression and categorical data analysis. Topics in the course will be presented with data generated from practical applications. (3 DE credits)

SENIOR YEAR COURSES

XLR8 APPLIED CALCULUS I

Students in this semester course learn about limits, continuity, differentiation of algebraic and transcendental functions with applications, and an introduction to integration. Prerequisite: Pre-Calculus I (3 DE credits)

XLR8 BLUEPRINT READING

Teaches the application of basic principles, visualization, orthographic projection, detail of drafting shop processes and terminology, assembly drawings and exploded views. Considers dimensioning, changes and corrections, classes of fits, tolerances and allowances, sections and convention in blueprint reading. (2 DE Credits)

XLR8 CALCULUS I & II

Presents analytic geometry and the calculus of algebraic and transcendental functions including the study of limits, derivatives, differentials, and introduction to integration along with their applications. Study of integral calculus of one variable including indefinite integral, definite integral and methods of integration with applications to algebraic and transcendental functions.   Designed for mathematical, physical and engineering science programs. Prerequisite: Pre-Calculus I and II (8 DE Credits)

XLR8 COORDINATED INTERNSHIP

Work-based learning opportunity for students in spring semester of senior year. (1 DE Credit)

XLR8 DEVELOPMENTAL PSYCHOLOGY

Studies the development of the individual from conception to death. Follows a life-span perspective on the development of the person's physical, cognitive, and psychosocial growth. (3 DE Credits)

XLR8 DIGITAL ELECTRONICS (PLTW)

This course is the study of electronic circuits that are used to process and control digital signals. Digital electronics is the foundation of all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras and high-definition televisions. The major focus of the DE course is to expose students to the process of combinational and sequential logic design, teamwork, communication methods, engineering standards and technical documentation. (3 DE credits)

XLR8 HUMAN ANATOMY & PHYSIOLOGY I & II

Integrates anatomy and physiology of cells, tissues, organs, and systems of the human body. Integrates concepts of chemistry, physics, and pathology. (8 DE Credits)

XLR8 INDUSTRIAL SAFETY-OSHA 10

Presents an introduction to occupational health and safety and its application in the workplace. Emphasizes safety standards and the Occupational Safety and Health Act (OSHA), its rules and regulations (OSHA 10). (1 DE Credit)

XLR8 LEGAL TOPICS IN NETWORK SECURITY

Conveys an in-depth exploration of the civil and common law issues that apply to network security. Explores statutes, jurisdictional, and constitutional issues related to computer crimes and privacy. Includes rules of evidence, seizure and evidence handling, court presentation and computer privacy in the digital age. (3 DE Credits)

XLR8 MEDICAL TERMINOLOGY

Provides an understanding of medical abbreviations and terms. Includes the study of prefixes, suffixes, word stems, and technical terms with emphasis on proper spelling, pronunciation, and usage. Emphasizes more complex skills and techniques in understanding medical terminology. (3 DE Credits)

XLR8 NETWORK ATTACKS, COMPUTER CRIME AND HACKING

Encompasses in-depth exploration of various methods for attacking and defending a network. Explores network security concepts from the viewpoint hackers and their attack methodologies. Includes topics about hackers, attacks, Intrusion Detection Systems (IDS) malicious code, computer crime and industrial espionage. (3 DE Credits)

XLR8 PRINCIPLES OF PSYCHOLOGY

Surveys the basic concepts of psychology. Covers the scientific study of behavior, behavioral research methods and analysis, and theoretical interpretations. Includes topics such as physiological mechanisms, sensation/perception, motivation, learning, personality, psychopathology, therapy, and social psychology. (3 DE Credits)

XLR8 PHYSICS 1 & 2

This course covers fundamental principles of physics. Includes mechanics, thermodynamics, wave phenomena, electricity and magnetism, and selected topics from modern physics with an emphasizes on technical applications, including precision measurement, statics, dynamics, energy and momentum, heat, sound, optics, and DC and AC electricity. (8 DE Credits)

XLR8 PRECALCULUS II

Students in this semester course learn about trigonometry, analytic geometry, sequences and series. (3 DE Credits)

XLR8 STEM Academy Learning Environment

- The Academy is housed on the campus of Central VA Community College
- Students enjoy more freedoms and are responsible for their own learning and time management
- Multidisciplinary connections between science, technology, engineering , mathematics and health science are emphasized
- All instructors at the STEM Academy are CVCC college professors
- Students receive an email account through CVCC
- Students learn critical thinking, creativity, innovation and real-world problem solving skills through hands-on project based learning
- Students are able to meet and network with local business and industry leaders
- Students are able to participate in a semester long internship experience with a local company

Eight Guiding Principles of the XLR8 STEM Academy

1. I will always act with **INTEGRITY** on projects and assignments
2. I understand my studies will require **INVESTMENT** of my time and talent
3. I will use my **IMAGINATION** to reach goals and expand my thinking
4. I will embrace my **INTELLIGENCE** to thrive as a leader and team player
5. I shall seek **INNOVATIVE** ways problem solve and support my community
6. I understand that everything I learn has a level of **IMPORTANCE**
7. I understand I am an **INDIVIDUAL** and take responsibility for all of my actions and decisions
8. I will find **INSPIRATION** in my pursuit of knowledge to embrace my own future

STEM Academy Quick Facts

- All STEM Academy students are Dual enrolled students at Central VA Community College
- Students can earn up to 44 college credits for their classes
- Students can earn up to two Career Studies Certificates from Central VA Community College.
- STEM Academy classes are weighted courses for Grade Point Average calculations for base school transcripts
- Parents/Guardians or student must provide transportation to internship locations in the spring
- STEM Academy operates during the morning hours from 8:00am- 11:00am
- STEM Academy is a partnership between CVCC, all five public school divisions, higher education and local business and industry leaders.

XLR8 School and Business Partners

Amherst County Schools	Hurt & Proffitt
Appomattox County Schools	Liberty University Engineering Dept.
Bedford County Schools	Liberty University Aeronautics
Campbell County Schools	Lynchburg Morning Rotary Club
Lynchburg City Schools	Lynchburg Regional Business Alliance
AECOM	Master Engineers & Designs
AIC	Moore's Electrical
AIT	Sharptop Co.
Appalachian Power	Successful Innovations, Inc.
AMG	Sweet Briar College
AMTI	Swissomation
AREVA	Timberlake Pharmacy
BWX Technologies	Union Bank
Centra & Centra PACE	VDOT
Central VA Community College	Workforce Investment Board
Cloudfit Software	WW Associates
Delta Star	Wegmann, USA
Electronic Design & Manufacturing Company (EDM)	Wells-Fargo
Harris, Inc.	

MATRICULATION

Central Virginia Community College	Randolph College
Centra College of Nursing	Sweet Briar College
Concord University	University of Alabama-Birmingham
George Mason University	University of Lynchburg
James Madison University	University of Kentucky
Liberty University	University of North Carolina-Charlotte
Old Dominion University	University of North Dakota
Mary Washington University	University of Virginia
Montana Tech	Virginia Military Institute
Norfolk State University	Virginia Tech
Radford University	

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XLR8 TEAM Members

Mrs. Susan Cash, Director, SDV 100 Instructor
B.S.   James Madison University, Psychology, SPED
M.Ed. Lynchburg College, School Counseling
M.Ed. Lynchburg College, Administration & Supervision

Ms. Beth Shelton, Mathematics Instructor
B.S.   Lynchburg College, Mathematics, Economics & Business
M.Ed. Lynchburg College, Educational Leadership

Mr. Stephen Boylan, Chemistry Instructor
B.S.   University of Cincinnati, Chemical Engineering
M.S.   University of Virginia, Engineering

Mr. Rex Fisher, Principles of Engineering Instructor
B.S.   Rochester Institute of Technology, Mechanical-Industrial Engineering

Ms. Marcella Gale, Introduction to Engineering Design Instructor
B.S.   University of Virginia, Electrical Engineering
M.S   Old Dominion University, Math, Science, Occupational &Technical Studies with a concentration in Career & Technical Education

Dr. Carl Pettiford, Digital Electronics Instructor
B.S.   University of Hawaii (Manoa), Electrical Engineering
M.S   University of Dayton, Electrical Engineering
PhD. Northeastern University, Electrical Engineering

Dr. Rebecca Honeycutt, Physics Instructor
B.S.   SUNY Oswego; Math
M.S.   Georgia Tech; Physics
PhD. Georgia Tech; Physics

Mr. Hugh Daughtrey, Cyber Security Instructor
B. S.   University of Virginia, Physics
M.Ed. University of Virginia, Science Education