STEM for All

Science, technology, engineering, and mathematics (STEM) careers are a growing segment of the U.S. job market; however, the United States currently lacks the talent to fill a portion of these positions. Integrating STEM into the K–12 curriculum is imperative if the United States wants to cultivate its own talent. This course, STEM for All, outlines the value of integrating STEM into the curriculum at each grade level and offers examples of STEM integration in the classroom and through cocurricular opportunities.

This course emphasizes also that STEM integration needs to move beyond the math and science classrooms and students who seek it out. Educators need to make sure STEM concepts are accessible to all students, including those who are presently underrepresented in STEM-based careers. STEM components need to be a part of curriculum and assessments to ensure success outside the classroom.

STEM competency is essential to the continued growth of our nation; therefore, it should be encouraged and accessible to all students in all arenas.

Course Objectives

By the end of this course, you will be able to

Module 1

- Explore science, technology, engineering, and mathematics education in K–12 education.
- Compare the presence of a STEM education to its absence.
- Describe the four elements that advance STEM learning.

Module 2

- Develop ways to make STEM more accessible and achievable in demographic groups that are underrepresented in STEM education and careers.
- Analyze barriers to STEM education for underrepresented groups and design programs and ways to overcome the barriers.

Module 3

- Design curricula that incorporate STEM education.
- Apply components of a rich STEM curriculum to lesson design.

Module 4

- Integrate curriculum components that engage students in STEM education by sparking interest and incorporating relevance.
- Design a unit that is engaging and interesting to students in an effort to attract them to STEM.

Module 5

- Gauge STEM learning using authentic assessments.
- Design assessments that diagnose and measure student learning of STEM.

Module 6

- Compare career paths to STEM fundamentals.
- Design career exploration programs for students.

Course Syllabus

Module 1	**An Interdisciplinary Approach** • Module Welcome • Reading: Promoting STEM in the K–12 Classroom • Video: A STEM Education: Tools to Change the World • Reading: AE—Promoting STEM Careers Starts in the K–12 Classroom • Reading: EL—Making STEM Real • Knowledge Check • Application: Incorporating STEM in All Classrooms • Post-Module Reflection
Module 2	**Making STEM Accessible to Underrepresented Groups** • Module Welcome • Reading: Addressing the STEM Gap • Reading: EU—Closing the STEM Gender Gap • Video: National Action Council for Minorities in Engineering (NACME)—Diversity in STEM • Reading: Imaginative Programs + Caring Mentors = Sparking STEM Interest in Underserved Youth • Video: Advancing All Students • Knowledge Check • Application: Determining STEM Interest and Overcoming Barriers • Post-Module Reflection
Module 3	**Designing a STEM-Oriented Curriculum** • Module Welcome • Reading: STEM Units that Engage Students • Reading: EU—Teaching and Learning Resources for STEM Education • Optional Video: Teaching Channel Presents: STEM in Action • Reading: AE—Tips for Engaging Students in Scientific Thinking • Video: Using Real-World Concepts: STEM Instruction • Knowledge Check • Application: Analyze a STEM Unit • Post-Module Reflection

Module 4	**Student-Centered STEM Activities** • Module Welcome • Reading: Moving Beyond Lessons • Reading: EL—The Art and Craft of Science • Reading: EL—Managing Messy Learning • Video: WISE4: Engaging Science Students via Inquiry and Simulations • Knowledge Check • Application: Expand STEM by Using Project Management • Post-Module Reflection
Module 5	**Authentic STEM Assessments** • Module Welcome • Reading: Assessing Critical Thinking and Problem Solving • Reading: AE—Preparing Creative and Critical Thinkers • Reading: EL—Practicing What We Preach in Designing Authentic Assessments • Multimedia: Authentic Assessment versus Traditional Assessment • Knowledge Check • Application: Design STEM Assessments • Post-Module Reflection
Module 6	**From the Classroom to Career** • Module Welcome • Reading: From Students to Professionals • Video: Case Studies in K–8 Science Education • Reading: EL—Research Says/Don't Overlook Middle-Skill Jobs • Knowledge Check • Application: Create a "Mock" STEM Program • Post-Module Reflection

Resources

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