



STEM: Physics and Principles of Engineering Syllabus

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Course Description:

Through problems that engage and challenge, students explore a broad range of physics and engineering topics, including mechanisms, the strength of structures and materials, and automation.

Students develop skills in problem solving, research, and design while learning strategies for design process documentation, collaboration, and presentation.

Classroom Expectations and Goals:

Students will work to improve on all six parts of the HACTC mission statement: Respect. Engage. Learn. Work. Serve. Grow.

Students will work to become proficient in their teamwork and leadership skills, communication skills, technical skills, and critical thinking/problem solving skills.

Students will become well informed of potential career and educational paths the STEM program will prepare them for.

Embedded Credit:

Completing this course, students will receive one Engineering credit, one Technology credit and one Physics credit.

Assignment Policy:

Students will complete all assignments that are available on the Canvas website. Students must also keep an up to date and accurate Engineering Notebook.

Assignments are given specific methods of submission that must be followed.

- Students may resubmit improved work for an improved grade.
- Test scores are final and may not be retaken for an improved grade.

Industry Recognized Credentials:

- WorkKeys National Career Readiness Certification (NCRC)

Concurrent Enrollments Offered:

- Principles of Engineering, St. Cloud State University, 3 credits

Common Standards Assessed in Every Program:

Communication: ESS02.01 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.

Leadership and Teamwork: ESS07.03 Employ teamwork skills to achieve collective goals and use team members' talents effectively.

Technical Skill: ESS10.01 Employ information management techniques and strategies in the workplace to assist in decision-making.

Problem Solving/Critical Thinking: ESS03.01 Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate).

Units of Study:

Unit 1: Energy and Power

- Mechanisms
- Energy Sources
- Energy Applications
- Design Problem–Energy and Power

Unit 2: Materials and Structures

- Statistics
- Material Properties
- Material Testing
- Design Problem–Materials and Structures

Unit 3: Control Systems

- Machine Control
- Fluid Power
- Design Problem–Control Systems

Unit 4: Statistics and Kinematics

- Statistics
- Kinematics

Grading Categories and Weights:

Communication	15%
Leadership/Teamwork	15%
Technical Skill	30%
Problem Solving/Critical Thinking	40%
Total	100%

Articulation Agreement:

- Keene State College

Standards Unique to STEM:

SCC02.01 Prepare STEM material in oral, written, or visual formats that provide information to an intended audience to fulfill specific communication need of an audience.

SCC03.01 Effectively develop and apply the skills inherent in systems engineering where requirements, configuration, integration, project management, quality assurance, and process applications are necessary.

SCC04.01 Effectively use information technology to gather, store, and communicate data in appropriate formats.

SCC04.02 Evaluate and use skills relating to the differing technological tools used to manipulate, report, or operate with data acquisition.

SCC06.01 Apply safety practices in the environment where science, technology, engineering, and/or mathematical principles are appropriate to ensure a safe workplace.

SCC06.02 Develop an awareness of safety, health, and environmental hazards inherent in the STEM arenas when solving problems, developing plans, processes, or completing projects to be proactive in promoting safety.

SCC08.01 Develop the knowledge and abilities to comprehend ethical and legal standards as they apply to STEM where plans, processes, and projects will be dependent upon them.

SCC09.01 Develop the skills and abilities to research career pathways in STEM.