



Class Title: Blue Engineering Lab

Subjects Covered: Science and STEM

Teacher Name: Candice Braun

Class Day: Monday

Class Size: 12

Overall Class Cost: \$160

Individual Student Supply Fee: \$0

Class Fee: \$96

Ages or color group served: Blue

What level is this class: Level 0

Prerequisites: NA

Graduation Requirements:

Completion Requirements:

To successfully complete Engineering Lab, students must:

- Meet HCU's standard attendance requirements for course completion.
- Participate appropriately in class activities and engineering challenges.
 - Work cooperatively with teammates during station activities.
 - Follow instructor directions and classroom safety expectations.
- Demonstrate responsible use, care, and cleanup of HCU engineering equipment and materials.

There are no tests, homework assignments, or final projects required for completion. Students earn course completion through consistent attendance and active participation in the hands-on engineering labs.

Homework Requirements: NA

Class Description:

Put on your engineer hat and get ready to build, test, troubleshoot, and try again!

Engineering Lab is a hands-on STEM class where students explore multiple areas of engineering through rotating small-group challenge stations. Working in engineering teams, students will experiment with mechanical systems and simple machines, electrical circuits and inventions, structural engineering, and physics-based design challenges.

Rather than simply following instructions to create a finished product, students will be encouraged to ask questions, test ideas, identify problems, make changes, and try again. Along the way, they'll develop an understanding of how gears, pulleys, circuits, motors, sensors, structures, forces, and motion work in the real world.

Students will rotate through engineering stations throughout the semester, allowing them to work with a variety of specialized STEM equipment and building materials while

developing teamwork, problem-solving, equipment responsibility, and confidence in the engineering design process.

No previous engineering, robotics, or coding experience is required. Curiosity and a willingness to experiment are highly encouraged!

Students Will Explore:

- The engineering design process
- Simple machines and mechanical systems
 - Gears and pulleys
- Electrical circuits
- Inputs, outputs, motors, and sensors
- Structural strength and stability
- Force, motion, gravity, and momentum
- Designing within constraints
- Testing and troubleshooting
- Learning from unsuccessful designs
- Collaborative problem-solving
- Responsible use and care of engineering equipment

Course Goal:

By the end of Engineering Lab, students should understand that engineering is not simply following directions or getting a project “right” on the first attempt. Engineering is a process of identifying problems, developing ideas, building solutions, testing them, learning from what happens, and improving the design.

Week 1:

Rotation 1 — Explore & Discover | Weeks 1–4

Students are introduced to four areas of engineering while learning how to work safely and collaboratively in an engineering lab.

Mechanical Engineering: Explore simple machines, gears, pulleys, motion, and mechanical systems through hands-on building challenges.

Electrical Engineering: Learn the basics of circuits, power, inputs, and outputs while constructing working electrical systems.

Structural Engineering: Investigate what makes structures strong and stable by designing, building, and testing structures.

Physics & Contraptions: Explore force, gravity, motion, momentum, and cause-and-effect through physical engineering challenges.

Week 2:

Rotation 1 — Explore & Discover | Weeks 1–4

Students are introduced to four areas of engineering while learning how to work safely and collaboratively in an engineering lab.

Mechanical Engineering: Explore simple machines, gears, pulleys, motion, and mechanical systems through hands-on building challenges.

Electrical Engineering: Learn the basics of circuits, power, inputs, and outputs while constructing working electrical systems.

Structural Engineering: Investigate what makes structures strong and stable by designing, building, and testing structures.

Physics & Contraptions: Explore force, gravity, motion, momentum, and cause-and-effect through physical engineering challenges.

Week 3:

Rotation 1 — Explore & Discover | Weeks 1–4

Students are introduced to four areas of engineering while learning how to work safely and collaboratively in an engineering lab.

Mechanical Engineering: Explore simple machines, gears, pulleys, motion, and mechanical systems through hands-on building challenges.

Electrical Engineering: Learn the basics of circuits, power, inputs, and outputs while constructing working electrical systems.

Structural Engineering: Investigate what makes structures strong and stable by designing, building, and testing structures.

Physics & Contraptions: Explore force, gravity, motion, momentum, and cause-and-effect through physical engineering challenges.

Week 4:

Rotation 1 — Explore & Discover | Weeks 1–4

Students are introduced to four areas of engineering while learning how to work safely and collaboratively in an engineering lab.

Mechanical Engineering: Explore simple machines, gears, pulleys, motion, and mechanical systems through hands-on building challenges.

Electrical Engineering: Learn the basics of circuits, power, inputs, and outputs while constructing working electrical systems.

Structural Engineering: Investigate what makes structures strong and stable by designing, building, and testing structures.

Physics & Contraptions: Explore force, gravity, motion, momentum, and cause-and-effect through physical engineering challenges.

Week 5:

Rotation 2 — Build & Apply | Weeks 5–8

Students return to each engineering area with new challenges requiring them to apply what they discovered during their first rotation.

Challenges become less instructional and more problem-based as students begin making their own design decisions, testing solutions, identifying failures, and modifying their designs.

Skills emphasized: planning, collaboration, troubleshooting, testing, measurement, observation, and redesign.

Week 6:

Rotation 2 — Build & Apply | Weeks 5–8

Students return to each engineering area with new challenges requiring them to apply what they discovered during their first rotation.

Challenges become less instructional and more problem-based as students begin making their own design decisions, testing solutions, identifying failures, and modifying their designs.

Skills emphasized: planning, collaboration, troubleshooting, testing, measurement, observation, and redesign.

Week 7:

Rotation 2 — Build & Apply | Weeks 5–8

Students return to each engineering area with new challenges requiring them to apply what they discovered during their first rotation.

Challenges become less instructional and more problem-based as students begin making their own design decisions, testing solutions, identifying failures, and modifying their designs.

Skills emphasized: planning, collaboration, troubleshooting, testing, measurement, observation, and redesign.

Week 8:

Rotation 2 — Build & Apply | Weeks 5–8

Students return to each engineering area with new challenges requiring them to apply what they discovered during their first rotation.

Challenges become less instructional and more problem-based as students begin making their own design decisions, testing solutions, identifying failures, and modifying their designs.

Skills emphasized: planning, collaboration, troubleshooting, testing, measurement, observation, and redesign.

Week 9:

Rotation 3 — Engineer & Innovate | Weeks 9–12

Students complete increasingly open-ended engineering challenges across all four stations.

Instead of being shown exactly how to solve a problem, engineering teams will be given a goal, available materials, and design constraints. Students must use their previous experiences to develop, test, and improve their own solutions.

Skills emphasized: engineering design, creative problem-solving, perseverance, communication, independent decision-making, and iterative design.

Week 10:

Rotation 3 — Engineer & Innovate | Weeks 9–12

Students complete increasingly open-ended engineering challenges across all four stations.

Instead of being shown exactly how to solve a problem, engineering teams will be given a goal, available materials, and design constraints. Students must use their previous experiences to develop, test, and improve their own solutions.

Skills emphasized: engineering design, creative problem-solving, perseverance, communication, independent decision-making, and iterative design.

Week 11:

Rotation 3 — Engineer & Innovate | Weeks 9–12

Students complete increasingly open-ended engineering challenges across all four stations.

Instead of being shown exactly how to solve a problem, engineering teams will be given a goal, available materials, and design constraints. Students must use their previous experiences to develop, test, and improve their own solutions.

Skills emphasized: engineering design, creative problem-solving, perseverance, communication, independent decision-making, and iterative design.

Week 12:

Rotation 3 — Engineer & Innovate | Weeks 9–12

Students complete increasingly open-ended engineering challenges across all four stations.

Instead of being shown exactly how to solve a problem, engineering teams will be given a goal, available materials, and design constraints. Students must use their previous experiences to develop, test, and improve their own solutions.

Skills emphasized: engineering design, creative problem-solving, perseverance, communication, independent decision-making, and iterative design.