

Course Syllabus

What you will learn in this course



Middle School Robotics 1a: Introduction

If you love the idea of identifying and solving problems through machine technology, then engineering may be the perfect profession for you! In this course, you'll learn about the types of engineers and engineering activities that are involved in designing robots. You'll explore the design process, models and software engineers use, careers in engineering and robotics, and more! You'll also use Micro:bit- a powerful pocket-sized computer- to full your learning! Let's get ready to think like an engineer!

Unit 1: Engineers to the Rescue

You have probably heard of engineering as a career. But what exactly does an engineer do? Do they just draw pictures of bridges and use lots of math? And how long have there been engineers in society? In this unit, you'll learn about the engineering career and exactly what engineers do. (Hint: They don't just draw

pictures!) You'll also learn about the history of engineers, some of the different areas they work in, and the other professionals they work with.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Identify engineers as problem solvers and describe the development of engineering through history
2. Classify different types of engineers and the tasks they work on
3. List some of the tasks engineers complete as part of their routine
4. Describe how engineers work with other professionals in engineering, STEM, and other fields

Unit 1 Assignments	
Assignment	Type
Lesson 01: What Is Engineering?	Lesson
Lesson 02: Types of Engineers	Lesson
Lesson 03: Engineering Tasks	Lesson
Lesson 04: The E in STEM	Lesson
Critical Thinking Questions	Submission
Activity 1: What Do I Want to Learn?	Submission
Activity 2: What Can an Engineering Marvel Teach Me About Innovation?	Submission
Activity 3: Where Do I See Evidence of Engineering?	Submission
Activity 3 (Alternate): Where Do I See Evidence of Engineering?	Submission
Unit 1 Discussion 1	Discussion
Unit 1 Discussion 2	Discussion
Unit 1 Quiz	Multiple Choice

Unit 2: Tools of the Trade

Problem-solving is a tricky business. An engineer can't just rely on their brains and past projects to get by. They must also learn how to use tools and models. Each tool probably has its own set of safety instructions. So, before an engineer can really get to work, they need to know what tools are good for the job and how to use them properly so that the engineer doesn't get hurt.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Classify the types of tools an engineer might use in their job

2. Use various forms of technical drawings to share ideas
3. Build a physical or digital model to test an idea or share a design
4. Summarize safety procedures and discuss ethics in technology

Unit 2 Assignments	
Assignment	Type
Lesson 01: What Kinds of Tools Do Engineers Use?	Lesson
Lesson 02: Drawing Like an Engineer	Lesson
Lesson 03: The Model Engineer	Lesson
Lesson 04: Staying Safe	Lesson
Critical Thinking Questions	Submission
Activity 1: How Do Engineers Sketch Their Ideas?	Submission
Activity 2: How Do I Keep Myself and Others Safe?	Submission
Unit 2 Discussion 1	Discussion
Unit 2 Discussion 2	Discussion
Unit 2 Quiz	Multiple Choice

Unit 3: Time to Get Complex

We describe processes or things as “complex” when they are challenging to understand. But what makes us feel that a complex thing is challenging? Sometimes, it has to do with how many different parts the object or problem has. The more things we have to wrap our minds around to comprehend, the more our minds get put to work. And lots of work feels challenging! How do engineers handle all the details of their complex problems? Let’s find out.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Describe and define different types of systems
2. Summarize the parts of a control system and explain each step
3. Classify simple machines that exist in everyday mechanisms
4. Provide measurements for a component and describe the purpose of schematics

Unit 3 Assignments	
Lesson 01: Let's Talk About Systems	Lesson
Lesson 02: Handling Complex Systems	Lesson
Lesson 03: Simple Machines	Lesson
Lesson 04: Measurement Units	Lesson
Critical Thinking Questions	Submission
Activity 1: How Do Systems Affect Our Everyday Lives?	Submission
Activity 2: How Do I Convert Between Measurement Systems?	Submission
Activity 3: How Can I Create My Own System of Inputs and Outputs?	Submission
Activity 3 (Alternate): How Can I Create My Own System of Inputs and Outputs?	Submission
Unit 3 Discussion 1	Discussion
Unit 3 Discussion 2	Discussion
Unit 3 Quiz	Multiple Choice

Midterm Exam

1. Review information acquired and mastered from this course up to this point.
2. Take a course exam based on material from the **first half** of the course (**Note:** You will be able to open this exam only one time.)

Midterm Exam Assignments	
Assignment	Type
Midterm Exam	Multiple Choice
Midterm Discussion	Discussion

Unit 4: What's Your Problem?

Problems are everywhere, and solving them is challenging, but if you have a specific process that you follow for every new project, it makes things a lot easier. The engineer's design process does just that. It is a roadmap for helping engineers tackle and solve the problems they take on.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Describe how an engineer defines a problem, as well as the criteria and constraints used to solve a problem

2. Identify the steps in designing and building a solution to a problem
3. Summarize the importance of evaluation in the engineering design process
4. Recite and define the steps of the engineering design process

Unit 4 Assignments	
Lesson 01: Starting with a Problem	Lesson
Lesson 02: Design and Build	Lesson
Lesson 03: Evaluate	Lesson
Lesson 04: The Design Cycle	Lesson
Critical Thinking Questions	Submission
Activity 1: How I Do Follow the Engineering Design Process?	Submission
Activity 2: How Can I Improve a System?	Submission
Activity 2 (Alternate): How Can I Improve a System?	Submission
Activity 3: What Have I Learned So Far?	Submission
Unit 4 Discussion 1	Discussion
Unit 4 Discussion 2	Discussion
Unit 4 Quiz	Multiple Choice

Unit 5: The Ins and Outs of Computers

In today's digital age, computers are integral parts of our daily lives. From the smartphones we carry in our pockets to the laptops we use for school or work, computers are everywhere. In this unit, we'll explore the basics of computers, how they are used in engineering and robotics, and how to be safe and ethical when using them.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Define the basic parts and components that make up a computer system
2. Summarize how an engineer uses computers to solve problems
3. Describe the relationship between computers and robotics
4. Demonstrate how to use a computer safely and ethically

Unit 5 Assignments	
Assignments	Type
Lesson 01: Computers: The Basics	Lesson
Lesson 02: Computers and Engineers	Lesson
Lesson 03: Computers and Robots	Lesson
Lesson 04: Computers and Safety	Lesson
Critical Thinking Questions	Submission
Activity 1: How Does a Computer Work?	Submission
Activity 2: How Do I Troubleshoot a Problem with My System?	Submission
Unit 5 Discussion 1	Discussion
Unit 5 Discussion 2	Discussion
Unit 5 Quiz	Multiple Choice

Unit 6: Everyday Engineering

We have already learned about the tools and processes that engineers use, so in this unit we'll look at some other skills engineers need, like collaboration, data management, and word processing skills. Then, we will wrap up this course with a final lesson on the skills necessary for a career as an engineer and explore what attributes you have that might make engineering a good career choice.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Discuss how society determines some of the projects that engineers work on
2. Identify how writing is used in the engineering field and the attributes of technical writing
3. Describe why data is important in engineering and how spreadsheets and presentation software are employed to share findings
4. Explain how to use strengths, weaknesses, and personal interests to explore career options

Unit 6 Assignments	
Lesson 01: Essential Skills for Robotics	Lesson
Lesson 02: Writing in Engineering	Lesson
Lesson 03: Data Skills	Lesson
Lesson 04: Choosing a Career	Lesson
Critical Thinking Questions	Submission
Activity 1: What Engineering Projects Are Happening in My Community?	Submission
Activity 2: What Engineering Career Is a Good Fit for Me?	Submission
Activity 3: What Did I Get Out of This Course?	Submission
Unit 6 Discussion 1	Discussion
Unit 6 Discussion 2	Discussion
Unit 6 Quiz	Multiple Choice

Final Exam

1. Review information acquired and mastered from this course up to this point.
2. Take a course exam based on material from **all units** in this course. (**Note:** You will be able to open this exam only one time.)

Final Exam Assignments	
Assignment	Type
Final Exam	Multiple Choice
Final Discussion	Discussion