

In this problem base course, scholars will explore the Human Cardiovascular System.

The human body is made up of several systems that work together to keep the body functioning properly. One of these systems is called the **cardiovascular** system. The job of the cardiovascular system is to move blood, which contains oxygen and nutrients, throughout the body to the different organs and the brain. The cardiovascular system is made up of the heart, **arteries**, **capillaries**, and **veins**. For the purpose of this course we will focus on the heart and arteries.

Build your own

In this medical and biomedical course, you will make a model of the cardiovascular system and investigate if plaque or narrowing in the arteries affects flow rate. Does blood pressure affect the flow rate?

Identify a problem within the Human Cardiovascular System

Choose a part of the Human Cardiovascular System that interests you and your team and identify a specific cardiovascular health problem your team wants to solve. After you select a problem, find out about the current treatments that people are already using to address this health issue. Why does this problem still exist, with or without treatment? Why aren't the current treatments good enough? What could be improved?

Design a solution that makes this problem better

Design a solution to your problem. Any solution is a good start. Your ultimate goal is to design an innovative solution that adds value to society by improving something that already exists, using something that exists in a new way, or inventing something totally new.

Share your problem and solution with others

Think about who your solution might help. Share your team idea(s) with guest speakers, researchers and other teams. Present your solution to people who have heart disease or **atherosclerosis**. Can you think of any other groups of people who might be interested in your idea? Finally, you team will prepare a presentation to share your work with a team of medical professionals, researchers, industry leaders and medical students.

Your presentation must be live and may include posters, slideshows, models, multimedia clips, props, costumes, and more. Be creative, but make sure you introduce your problem, solution, and how you shared your idea.

Among other experiments, students will have the opportunity to noninvasively record their own **cardiovascular** activity. The course will wrap up with a trip to The Columbia Memorial Space Center in Downey, California. Scholars will experience the Challenger Learning Center (CLC) and be transformed into a scientist, engineer or researcher on a **simulated space mission**. From the moment of lift-off to the completion of the mission, all scholars will become critical members of a team as they work to complete their mission objectives as both mission controllers and astronauts. Scholars in the Medical and

Biomedical Pathway will become part of the Medical Team on the mission. Medical Officers will monitor all spacecraft astronauts for auditory and visual response time, respiration rate, skin temperature and heart rate.

At course end, scholars will understand the basic anatomy of the human cardiovascular system and the job of the cardiovascular system. They will leave the course knowing the cardiovascular system is made up of the heart, **arteries**, **capillaries**, and **veins**. Scholars will understand the importance of a healthy cardiovascular system and the risks of failing to maintain good cardiovascular health. They will explore the result of heart disease or **atherosclerosis**.

We hope that each scholar leave this course with more questions about the human body and begins to look at these real world problems with curiosity, innovation, and a desire for discovery.

Terms and Concepts

- Cardiovascular
- Artery
- Capillary
- Vein
- Muscle
- Pump
- Atrium
- Ventricle
- Aorta
- Coronary
- Atherosclerosis
- Plaque
- Blood clot
- Absolute value
- Magnitude
- Density
- Hagen-Poiseuille's equation

Questions

- What causes your heart to beat?
- What are the four different heart valves?
- What can happen to your brain if blood doesn't flow to it?
- What happens to your body during a heart attack?
- What is plaque made of?
- What can happen to your legs if there isn't enough blood flow to them?