



# Bioengineering

## Course Description

9401 Starcrest Drive  
San Antonio, Texas 78217  
Ph: (210) 483-9100  
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[www.smhall.org](http://www.smhall.org)

### Bioengineering

1/2 credit, spring semester course

**Pre-requisite:** Upper school physics, middle school life science

### Course Description:

Bioengineering is the hands-on, project-based learning that is the essence of engineering. Students work together to answer questions and solve problems, and as they do so they collaborate, think critically and creatively, and communicate with one another. They also make decisions based on objective measures and data and learn to fail and then recover from failure by using a systematic approach.

### Principle objectives for the students:

- Experience the engineering development cycle in a team setting;
- Understand the connections between biology and engineering.

### Knowledge and skill to be learned and applied:

- Taking scientific research approaches towards problem-solving;
- Establishing and maintaining documentation in the project process;
- Understanding basic human anatomy from engineering perspective;
- Understanding and applying mechanical engineering concepts in design and construction;
- Using systems thinking and an iterative process to solve problems.

### Research project – each student proposes a conceptual prosthetic body part or organ

- Conduct research on existing and developing prosthetic products;
- Design (individually or in pairs) a conceptual prosthetic body part or organ;
- Using 3D modeling software to render the design.

### Hands-on project – design and build mechanical components that resemble prosthetic body parts

- Base – motorized platform to carry around additional components
- Joints – motorized arm with shoulder and elbow joints that can move in multiple directions
- Pulse – motorized continuous linear movements that simulates the pumping of blood
- Sensors – color and ultrasonic sensors to be programmed to gather information in the environment
- Integrate – install the joint and pulse to the base and add sensors to perform certain tasks



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**Students will be assigned and graded on tasks in three perspectives:**

- Managing project
- Scientific researching
- Mechanical Engineering