

# ENGINEERING

The Engineering Career Cluster focuses on the planning, designing, testing, building, and maintaining of machines, structures, materials, systems, and processes using empirical evidence and science, technology, and math principles.

## Mechanical and Aerospace Engineering

The Mechanical and Aerospace Engineering program focuses on occupational and educational opportunities associated with the design, development, maintenance, and testing of engines, machines, and structures related to aircraft and spacecraft. Students will design, test, and evaluate projects related to aerodynamics, structural, and mechanical design. Students will apply scientific, mathematical, and empirical evidence to solve problems related to navigation, mechanics, robotics, propulsion, and combustion.

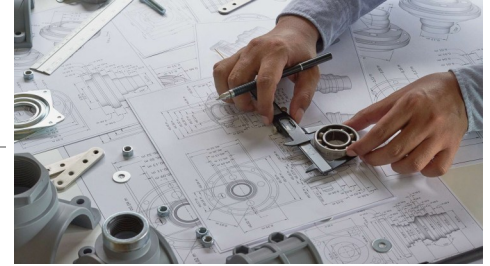
### Mechanical and Aerospace Engineering Belton New Tech High School Course Pathway

Investigation	<ul style="list-style-type: none"> <li>◆ Gateway I (PLTW)*</li> <li>◆ Principles of Applied Engineering</li> <li>◆ Introduction to Aerospace &amp; Aviation</li> </ul>
Navigation	<ul style="list-style-type: none"> <li>◆ Engineering Science</li> </ul>
Preparation	<ul style="list-style-type: none"> <li>◆ Aerospace Design I</li> </ul>
Application	<ul style="list-style-type: none"> <li>◆ Scientific Research &amp; Design</li> <li>◆ Career Preparation for Program of Study</li> </ul>

#### Aligned Advanced Placement Courses:

\*These courses do not count toward Concentrator/Completer status.

- ◆ AP Calculus AB\*
- ◆ AP Calculus BC\*
- ◆ AP Physics I\*
- ◆ AP Physics II\*
- ◆ AP Statistics\*



**ALIGNED ENDORSEMENT:** Successful completion of the Engineering Foundations program of study fulfills the requirements of the Business & Industry endorsement. A STEM endorsement is also fulfilled with the required math and science credits.

#### ALIGNED OCCUPATIONS

##### Aerospace Engineering & Operations Technicians

- ◆ Median Wage: \$48,204
- ◆ Annual Openings: 192
- ◆ 10-year Growth: 21%

##### Mechanical Engineers

- ◆ Median Wage: \$99,937
- ◆ Annual Openings: 1,755
- ◆ 10-year Growth: 18%

##### Aerospace Engineers

- ◆ Median Wage: \$115,694
- ◆ Annual Openings: 483
- ◆ 10-year Growth: 18%

#### WORK-BASED LEARNING

- ◆ Internship at an aviation, or aerospace company
- ◆ Job shadow an engineer

#### EXPANDED LEARNING

- ◆ TSA or SkillsUSA participation
- ◆ Participate in an engineering association

#### INDUSTRY-BASED CERTIFICATIONS

- ◆ Autodesk Associate Fusion 360
- ◆ Autodesk Associate AutoCAD
- ◆ Autodesk Associate Revit for Architecture

#### Stackable IBCs/Licensures

- ◆ Professional Engineer (PE License)
- ◆ Aerospace Engineering Cert.

#### POSTSECONDARY LEARNING

##### Apprenticeships

- ◆ Mechanical Engineering Technician

##### Associate Degrees

- ◆ Mechanical Engineering
- ◆ Aeronautics/Aviation/Aerospace Science & Technology, General

##### Bachelor's, Master's, Doctoral, & Professional Degrees

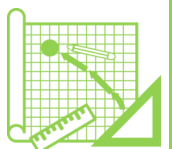
- ◆ Aeronautical/Aerospace Engineering
- ◆ Aeronautics/Aviation Science
- ◆ Electrical & Electronics Engineering



## Mechanical and Aerospace Engineering Course Details

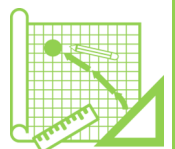
COURSE	GRADE LEVEL	PREREQUISITES	COURSE CODE BISD CODE COURSE CREDIT	ALIGNED IBC	CAMPUS
Gateway I (PLTW) <sup>^</sup> <sup>^</sup> Does NOT count toward POS concentrator or completer status	7	None	—		BMS LBMS NBMS SBMS
Principles of Applied Engineering* (Level 1)	7-8	None	13036200 27705 1 credit		BMS LBMS NBMS SBMS
Introduction to Aerospace & Aviation* (Level 1)	9-12	None	1304672 27724 1 credit	Autodesk Associate Certified User Inventor for Mechanical Design	BHS LBHS BNT
Engineering Science* (Level 3)  (Satisfies a science requirement)	10-12	Algebra I Biology 1+ course for 1+ credit in Engineering career cluster	13037500 27715 1 credit	Autodesk Associate Certified User Inventor for Mechanical Design	BHS LBHS BNT
Aerospace Design I* (Level 2)	11-12	One or more credits in a level 2 or higher Mechanical & Aerospace Engineering course	12756040 27726 1 credit	Autodesk Associate Certified User Inventor for Mechanical Design	BNT
Scientific Research & Design (Level 4)  (Satisfies a science requirement)	12	Biology Chemistry IPC or Physics 2+ courses for 2+ credits in Engineering career cluster	13037200 27735 1 credit		BHS LBHS BNT
Career Prep or Ext. Career Prep for POS* (Level 4)  (Related job placement required—10 hrs/wk; or 15 hrs/wk)	12	2+ courses for 2+ credits (with level 2 or higher course) in aligned POS	12701121 27516 2 credits  12701141 27517 3 credits		BHS LBHS BNT

\*Course is included in additional programs of study.



# Mechanical & Aerospace Engineering Course Descriptions

Gateway I (PLTW Flight & Space + App Creators))	Students trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms.
Principles of Applied Engineering (PLTW Design & Modeling + Automation & Robotics)	Principles of Applied Engineering provides an overview of the various fields of science, technology, engineering, and mathematics and their interrelationships. Students develop engineering communication skills, which include computer graphics, modeling, and presentations, by using a variety of computer hardware and software applications to complete assignments and projects. Upon completing this course, students will have an understanding of the various fields of engineering and be able to make informed career decisions.
Introduction to Aerospace & Aviation	The Introduction to Aerospace and Aviation course will provide the foundation for advanced exploration in the areas of professional pilot, aerospace engineering, and unmanned aircraft systems. Students will learn about the history of aviation, from Davinci's ideas about flight to the Wright brothers and the space race, along the way students will learn about the innovations and technological developments that have made today's aviation and aerospace industries possible. The course includes engineering practices, the design process, aircraft structure, space vehicles past and present, and a look toward future space exploration.
Engineering Science	Engineering Science is an engineering course designed to expose students to some of the major concepts and technologies that they will encounter in a postsecondary program of study in any engineering domain. Students will have an opportunity to investigate engineering and high-tech careers. In Engineering Science, students will employ science, technology, engineering, and mathematical concepts in the solution of real-world challenge situations. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students will also learn how to document their work and communicate their solutions to their peers and members of the professional community.
Aerospace Design I	Students enrolled in Aerospace Design I demonstrate knowledge and skills associated with the design evolution and emerging trends of aircraft and aerospace systems. Fundamental concepts such as forces of flight, structures, aerodynamics, propulsion, stability and control, and orbital mechanics are introduced as related to design decisions for atmospheric and space flight. These concepts are related to mission requirements and solution approaches.
Scientific Research & Design	Scientific Research and Design is a broad-based course designed to allow districts and schools considerable flexibility to develop local curriculum to supplement any program of study or coherent sequence. The course has the components of any rigorous scientific or engineering program of study from the problem identification, investigation design, data collection, data analysis, formulation, and presentation of the conclusions. All of these components are integrated with the career and technical education emphasis of helping students gain entry-level employment in high-skill, high-wage jobs and/or continue their education.



## Mechanical & Aerospace Engineering Course Descriptions (cont.)

Career Preparation for Program of Study

Career Preparation I provides opportunities for students to participate in a work-based learning experience that combines classroom instruction with business and industry employment experiences. The goal is to prepare students with a variety of skills for a changing workplace. Career preparation is relevant and rigorous, supports student attainment of academic standards, and effectively prepares students for college and career success.

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