# Engineering and Architecture Pathway Courses

<table>
<thead>
<tr>
<th>CBEDS Code</th>
<th>Course Title</th>
<th>Course Hours</th>
<th>Primary Pathway</th>
<th>Course Sequence Level</th>
<th>Suggested Grade Level(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5571</td>
<td>Civil Engineering and Architecture</td>
<td>180</td>
<td>Architectural Design</td>
<td>Introductory</td>
<td>9, 10, 11, 12</td>
</tr>
<tr>
<td>5574</td>
<td>Principles of Engineering &amp; Design Technology</td>
<td>180</td>
<td>Engineering Technology</td>
<td>Concentrator</td>
<td>10, 11, 12</td>
</tr>
<tr>
<td>5781</td>
<td>RCOE Physics Using Robotic Engineering Technology (UC a-g “d”)</td>
<td>180</td>
<td>Engineering Design</td>
<td>Capstone</td>
<td>11, 12</td>
</tr>
<tr>
<td>5782</td>
<td>Engineering Design Seminar</td>
<td>Class = 180 CC/CVE = 360 Total = 540</td>
<td>Engineering Technology</td>
<td>Capstone</td>
<td>11, 12</td>
</tr>
<tr>
<td>5705</td>
<td>Computer Aided Drafting I</td>
<td>180</td>
<td>Architectural Design</td>
<td>Introductory</td>
<td>9, 10</td>
</tr>
<tr>
<td>5705</td>
<td>Computer Aided Drafting II</td>
<td>180</td>
<td>Architectural Design</td>
<td>Concentrator</td>
<td>10, 11, 12</td>
</tr>
<tr>
<td>5705</td>
<td>Computer Aided Drafting III</td>
<td>180</td>
<td>Architectural Design</td>
<td>Concentrator/ Capstone</td>
<td>11, 12</td>
</tr>
<tr>
<td>5705</td>
<td>Computer Aided Drafting IV</td>
<td>180</td>
<td>Architectural Design</td>
<td>Capstone</td>
<td>11, 12</td>
</tr>
</tbody>
</table>

Using Perkins Guidelines and Instructions, and the CTE Framework the following definitions are utilized in course sequences and pathways:

- **Pathway** – Designed to provide students with a non-duplicative sequence of progressive achievement leading to technical skill proficiency, a credential, a certificate, or a degree.

- **CTE Course Sequencing** – The process of developing at least two sequential courses in each CTE program offered by the school. A preferable sequence format has at least three courses in each program, adding a capstone or advanced course to (1) an introductory and concentration course; or (2) two concentration courses.

- **Introductory** – Preliminary course, beginning level containing introductory concepts required to build foundational and general knowledge.

- **Concentrator** – A CTE course beyond the introductory level that is intended to provide more in-depth instruction in and exploration of a specific industry sector.

- **Capstone** – The final course in a planned sequence of courses that provides a rigorous and intensive culmination of a course of study.
Engineering and Architecture Pathway Courses

Industry Sector: Engineering and Architecture

Architectural Design and Engineering Technology Pathways

Provides learning opportunities for students interested in preparing for careers in such areas as architecture, industrial design, and civil engineering. Engineering Technology provides learning opportunities for students interested in preparing for careers in the design and production, or maintenance of mechanical, electrical, electronics, or electromechanical products and systems.

Course Title: Civil Engineering and Architecture

Course Description: This course is based on the Engineering and Architecture industry sector of the California Career Technical Education Model Curriculum Standards. This course introduces civil engineering practice and calculations which includes: angle measurement, maps and site plans, traversing, leveling and profiles, road and pipeline design, and earthwork drawing and calculation. Course content also includes influence on design, architecture and the external environment, mechanics and properties of structural materials including characteristics and qualities necessary for proper selection and use. The analysis of simple structures and architectural and construction plan reading is also studied.

Course Title: Principles of Engineering & Design Technology

Course Description: This course explores the interaction of science and technology. Students are introduced to various types of engineering as well as the underlying mathematics and scientific concepts associated with these disciplines. The engineering disciplines students will explore are: 1) Robotics – physics, electronics, and computer programs; 2) Architecture – CAD, modeling, structural design principles, and physics; 3) Mechanical – power systems, engines, and motors; and 4) Civil – bridges, building/construction, rail systems, escalators, construction design, and military. Using the design team as a model, students work in small groups to research, design, and construct engineering projects. Students will deepen their understanding of science by building on their knowledge of physics and mathematics and by conducting investigative research. Included is instruction in the history of engineering and the scientific theory behind technological advances in civilization.

Course Title: RCOE Physics Using Robotic Engineering Technology

Course Description: This course is based on the Engineering and Architecture industry sector of the California Career Technical Education Model Curriculum Standards. This course integrates the learning of physics with the application of knowledge using robots. Students learn the traditional topics of physics: kinematics, electricity and magnetism, heat, light, and waves. Students apply their knowledge by designing and experimenting with robots and other applications projects. These experiences will enhance knowledge of physics through solving of engineering problems and evaluation of results. Students, working individually and in teams, participate in a series of hands-on experimental projects such as building, programming, and experimenting with robots. The projects provide a foundation for data collection, analysis, reflection, presentations and technical writing skills. Through these experiences students hone critical thinking, communication, collaboration, creativity and Career Technical Education skills while learning key physics, engineering, and design concepts.

This year-long course combines elements of physics, engineering, and green technology and has been approved by the University of California and meets the entrance requirement “d” category of lab science.
Engineering and Architecture Pathway Courses

Industry Sector: Engineering and Architecture

Course Title: Engineering Design Seminar

Course Description: The knowledge and skills students acquire throughout the Engineering Pathway provide the foundation for this capstone project-based course. Students will identify an issue and then research, design, and test solutions. Students will dig deep into the engineering design process, applying math, science, and engineering standards to hands-on projects. They will work both individually and in teams to design solutions to a variety of problems using technology. Culminating activities will include learning the bid process, development of proposals, and preparation of technical writings and documents. Students will work closely with business and industry partners on authentic world-of-work projects.

*Prerequisite: Ability to provide transportation to internship site.

Course Title: Computer Aided Drafting I (2D CAD)

Course Description: Students will learn basic operations of computer-aided drafting in 2D, detail drawings, and computerized tasks. Students will utilize Computer-Aided Drafting (CAD) software to accomplish tasks and learn mathematical calculations used within the industry.

Course Title: Computer Aided Drafting II (Manufacturing Drawing)

Course Description: Students will learn manufacturing drawing of computer-aided drafting in 3D. Students will study and practice surface models, solid models, and rendering in relation to manufacturing drawing packages. Students will utilize Computer-Aided Drafting (CAD) software to accomplish tasks and learn mathematical calculations used within the industry.

Course Title: Computer Aided Drafting III (Architectural Drawing)

Course Description: Students will learn architectural drawing of computer-aided drafting in 3D. Students will study and practice architectural drawing and rendering. Students will utilize Computer-Aided Drafting (CAD) software to accomplish tasks and learn mathematical calculations used within the industry.

Course Title: Computer Aided Drafting IV (Civil Drawing)

Course Description: Students will learn civil drawing of computer-aided drafting in 3D. Students will study and practice civil drawing and rendering. Students will utilize Computer-Aided Drafting (CAD) software to accomplish tasks and learn mathematical calculations used within the industry.