

## COMPUTER SCIENCE, ENGINEERING, AND TECHNOLOGY (CSET) DIVISION

**WENDY CUSTABLE, DIRECTOR** | WCUSTABLE@D125.ORG | 847-415-4151

The Computer Science, Engineering, and Technology Division (CSET) Division offers a robust program of electives in the areas of computer science, engineering, and technology. Within these project-based courses, students will develop an innovative and problem-solving mindset while pursuing professional and personal endeavors. The rich curricula connects students to the core content areas in a collaborative, lab-based environment using state-of-the-art tools and software.

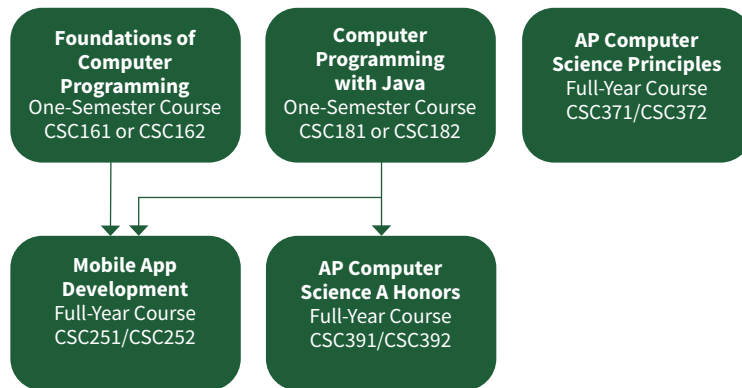
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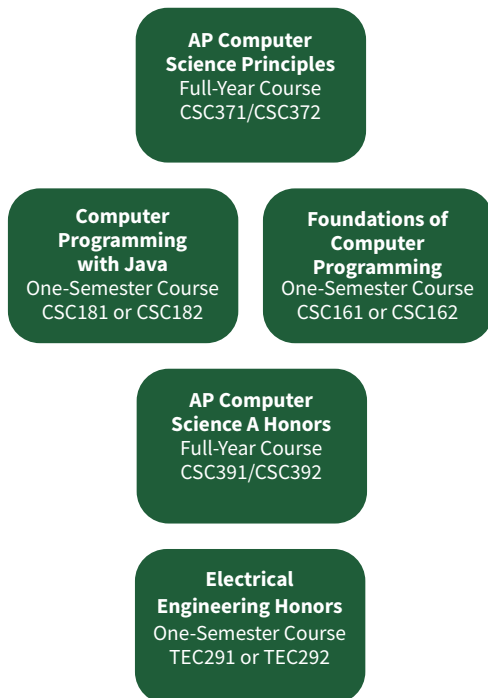
# COMPUTER SCIENCE COURSE OFFERINGS

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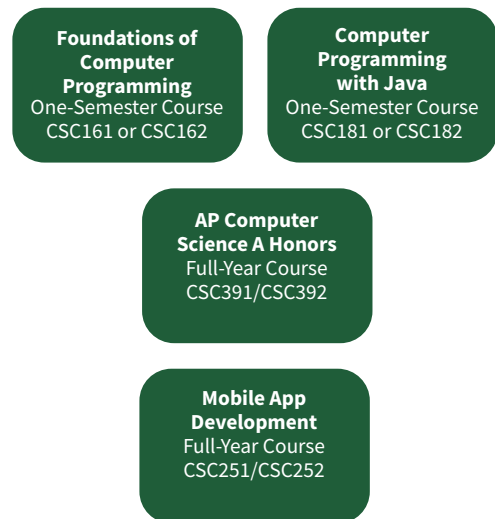
## COMPUTER SCIENCE PATHWAY



## COMPUTER ENGINEERING PATHWAY



## COMPUTER PROGRAMMING PATHWAY



# COMPUTER SCIENCE

COMPUTER SCIENCE COURSES ARE DESIGNED TO ENGAGE STUDENTS IN THE WORLD OF COMPUTER PROGRAMMING, NO EXPERIENCE REQUIRED. THE HANDS-ON COMPUTER-BASED CURRICULA INTRODUCES STUDENTS TO PROGRAMMING LANGUAGES LIKE PYTHON AND JAVA, AS WELL AS PROVIDE OPPORTUNITIES TO EXPLORE HOW CODING CONNECTS TO THEIR OWN LIVES. ADVANCED PLACEMENT (AP) COURSE OPTIONS ARE AVAILABLE WITHIN THIS PROGRAM.

## FOUNDATIONS OF COMPUTER PROGRAMMING (COLLEGE PREP)

### GPA WAIVER OPTION

CSC161—SEMESTER 1

OPEN TO 9-10-11-12

PREREQUISITE: CONCURRENT ENROLLMENT OR DEMONSTRATED PROFICIENCY IN ALGEBRA 1

CSC162—SEMESTER 2

ONE SEMESTER

This one-semester course introduces students to the foundations of computer programming using Python. Python's syntax is easy to read and write for those with limited experience with programming, making it an ideal language for those looking for an introduction to the field of computer science. In addition, Python is widely used across a range of industries such as business, web application development, project management, data analysis, and machine learning. Python is an excellent choice for anyone who wants to be prepared for the technical demands their career might include.

The course introduces students to the foundational ideas of computer programming and computational thinking with an emphasis on problem-solving. Students will learn both how to read and write computer programs for a variety of applications. Python packages (for communications, internet services, and graphics for example) will be used by students to develop increasingly sophisticated programs. Topics for this course include input and output commands, making decisions with conditional statements and Boolean logic, repeating a set of steps with looping structures, and simplifying/organizing code with the help of functions. Successful completion of this one-semester course prepares the student for CSC251/252 (Mobile App Development).

## COMPUTER PROGRAMMING WITH JAVA (COLLEGE PREP)

### GPA WAIVER OPTION

CSC181—SEMESTER 1  
OPEN TO 9-10-11-12  
PREREQUISITE: CONCURRENT ENROLLMENT OR DEMONSTRATED PROFICIENCY IN ALGEBRA 1

CSC182—SEMESTER 2  
ONE SEMESTER

This one-semester course is intended for students who possess some programming experience or who have successfully completed CSC161 or CSC162 (Foundations of Computer Programming) and seek a deeper understanding of computer programming concepts. Java is a legacy language that has broad worldwide popularity. Due to Java's longevity, available support for Java is extensive and many industries make use of Java-based applications. Java developers continue to be in high demand. Java is highly portable (as it can run on many computer platforms) and provides an easy-to-learn introduction to the world of object-oriented program design.

This course reviews foundational coding framework and concepts and introduces students to the object-oriented design using the Java programming language. Students will explore and work with various levels of data types, input and output commands, conditional statements, Boolean operators (and, or, not), looping structures, common algorithms, and the use of array. Successful completion of this one-semester course prepares the student for CSC251/252 (Mobile App Development) and CSC391/392 (AP Computer Science A).

## AP COMPUTER SCIENCE A (HONORS)

CSC391—SEMESTER 1  
OPEN TO 10-11-12  
PREREQUISITE: SUCCESSFUL COMPLETION OF CSC181 OR CSC182 (COMPUTER PROGRAMMING WITH JAVA)

CSC392—SEMESTER 2  
FULL YEAR

This course introduces students to object-oriented programming methodology with an emphasis on problem solving and algorithm development. It is meant to be the equivalent of a first-semester college course in Computer Science. Students will learn how to code more sophisticated concepts in Java. The course emphasizes the design issues that make programs understandable, adaptable, and reusable. It also includes the study of fundamental data structures, abstraction, and recursion. Students who enroll in this course will be prepared to take the AP Computer Science A exam in May.

## AP COMPUTER SCIENCE PRINCIPLES (HONORS)

CSC371—SEMESTER 1  
OPEN TO 10-11-12  
PREREQUISITE: ALGEBRA 1

CSC372—SEMESTER 2  
FULL YEAR

This course provides students with an understanding of the fundamental concepts of computing, its breadth of application, and its potential for transforming the world we live in. Students enrolled in this course will discover that computing is a creative activity; abstraction reduces information and detail to facilitate focus on relevant concepts; data and information facilitate the creation of knowledge; algorithms are used to develop and express solutions to computational problems; programming enables problem solving, human expression, and creation of knowledge; the internet pervades modern computing; and computing has a global impact. Student discovery and creativity are central to the delivery of course curriculum. Students will find opportunities to be challenged and to discover the creativity within computing, regardless of their programming or computing background. Students who enroll in this course will be prepared to take the AP Computer Science Principles exam in May.

## MOBILE APP DEVELOPMENT (COLLEGE PREP)

### GPA WAIVER OPTION

CSC251—SEMESTER 1  
OPEN TO 9-10-11-12  
PREREQUISITE: SUCCESSFUL COMPLETION OF CSC161 OR CSC162 (FOUNDATIONS OF COMPUTER PROGRAMMING) OR CSC181 OR CSC182 (COMPUTER PROGRAMMING WITH JAVA).

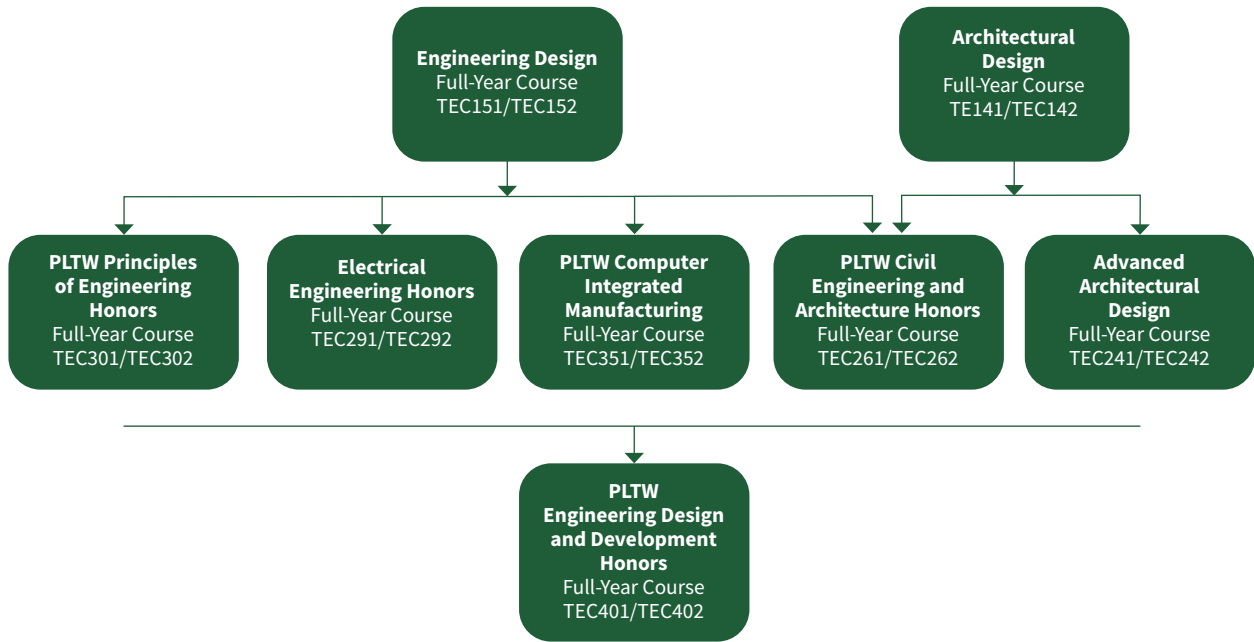
CSC252—SEMESTER 2  
FULL YEAR

This full-year course introduces students to the world of app development for mobile devices (such as smartphones and tablets). Students will work in a collaborative, lab-based environment that utilizes industry-standard processes and development strategies similar to those a professional app development company might employ. Each unit begins by introducing students to specific skills and ideas that will be used to modify and redesign existing mobile apps. Each unit concludes with students applying the concepts learned to create an application on their own. Topics include: event-driven programming strategies, app structure, algorithm design, and user-interface design. Successful completion of this course provides students with a strong command of the fundamental strategies necessary to develop high quality apps.

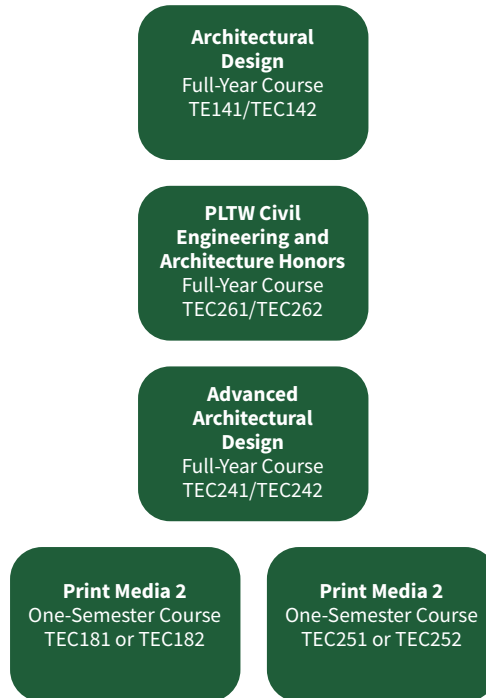
# ENGINEERING COURSE OFFERINGS

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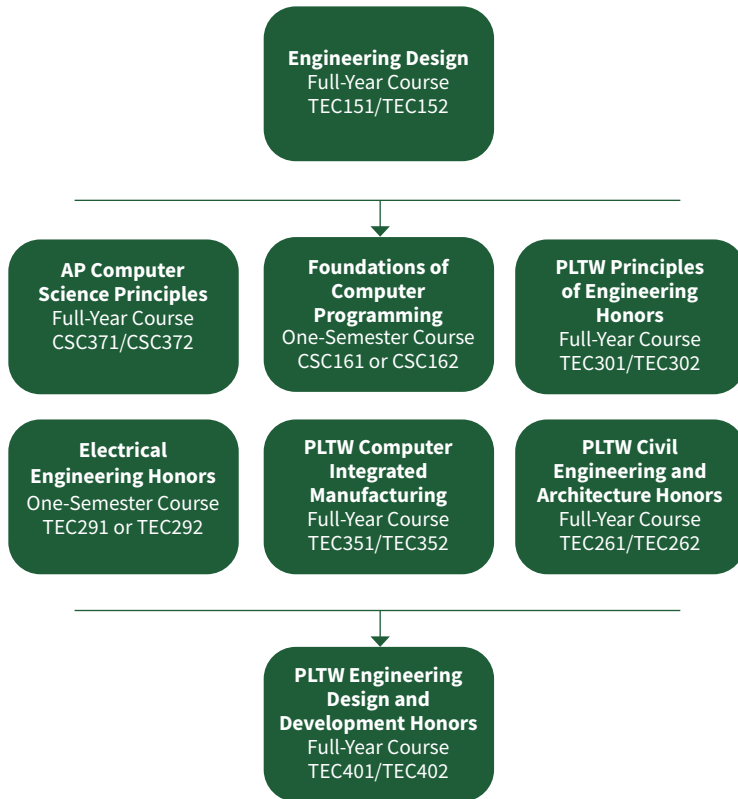
## ENGINEERING AND ARCHITECTURE PATHWAY



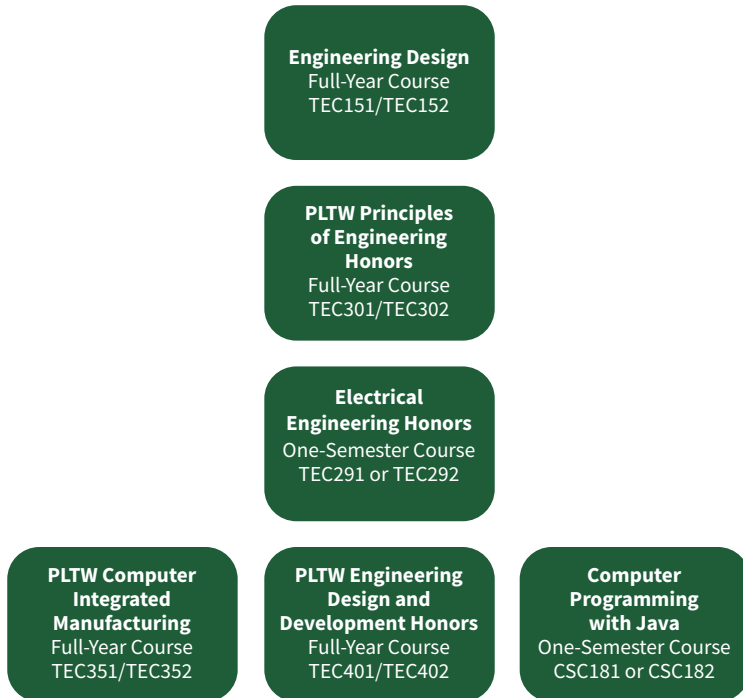
## ARCHITECTURE PATHWAY



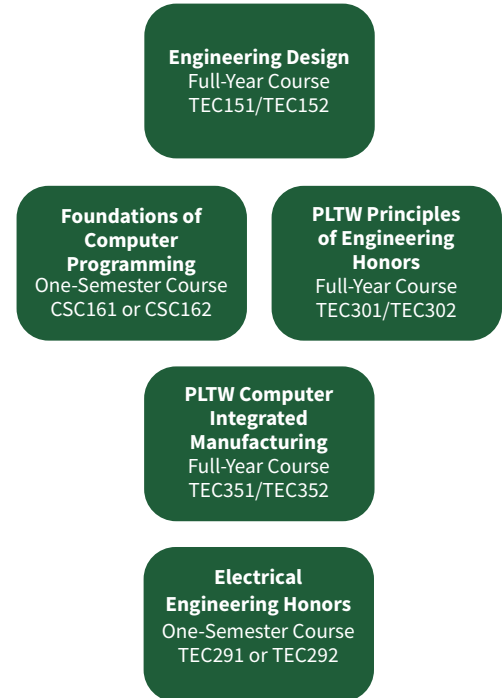
GENERAL ENGINEERING (MECHANICAL) PATHWAY



ELECTRICAL ENGINEERING PATHWAY



ROBOTICS ENGINEERING PATHWAY



# ENGINEERING

WHETHER STUDENTS ASPIRE TO DEVELOP A CAREER IN FIELDS OF ARCHITECTURE OR ENGINEERING, OR ARE JUST LOOKING FOR A CREATIVE OUTLET TO DEVELOP PROBLEM-SOLVING SKILLS, THE COURSES WITHIN THIS PROGRAM ARE EXCELLENT ELECTIVE OPTIONS. ALL COURSES ARE HANDS-OUT, COLLABORATIVE AND UTILIZE INDUSTRY STANDARDS SOFTWARE AND TOOLS. STUDENTS CAN CHOOSE COURSES FROM MULTIPLE PATHWAYS INCLUDING: MECHANICAL ENGINEERING, ELECTRICAL ENGINEERING, COMPUTER ENGINEERING, ARCHITECTURE, AND ROBOTIC ENGINEERING.

## ARCHITECTURAL DESIGN (COLLEGE PREP)

### GPA WAIVER OPTION

TEC141—SEMESTER 1	TEC142—SEMESTER 2
OPEN TO 9-10-11-12	FULL YEAR
PREREQUISITE: NONE	

Architectural Design is an entry-level architecture course that provides students with the opportunity to develop architectural design, planning, and drawings skills. This course is designed to introduce students to the concepts, theories, and practices of the professional architect. Students will use 3-D architectural software, used by professional architects, to develop skills in residential design including: renderings, floor plans, site plans, elevations, and section drawings. Students will design a home from the ground up learning about the guidelines to designing a functional kitchen, living spaces, and sleeping spaces. Students will also study different architectural styles and create a physical model of a style of their choice. In addition, students learn about documenting their project, solving problems, and communicating their solutions to their peers.

## ADVANCED ARCHITECTURAL DESIGN (COLLEGE PREP)

### GPA WAIVER OPTION

TEC241—SEMESTER 1	TEC242—SEMESTER 2
OPEN TO 10-11-12	FULL YEAR
PREREQUISITE: PLTW CIVIL ENGINEERING AND ARCHITECTURE OR ARCHITECTURAL DESIGN	

Advanced Architectural Design is recommended for students interested in pursuing a career in architecture and/or interior design. This course is designed to prepare students for the wide variety of technical and computer software skills needed for higher education courses and within the workforce. Students will use architectural software and technology that is used by professional architects including: Autodesk Revit, Autodesk AutoCAD, SketchUp, Adobe InDesign, Adobe Photoshop, and a laser printer. Students will use this software to aid in designing residential and commercial buildings and to create physical laser cut models of their designs.

## ENGINEERING DESIGN (COLLEGE PREP)

### GPA WAIVER OPTION

TEC151—SEMESTER 1	TEC152—SEMESTER 2
OPEN TO 9-10-11-12	FULL YEAR
PREREQUISITE: NONE	

Engineering Design is a full-year course available to all students. In this course, students use 3-D solid modeling design software to help them design solutions to solve proposed problems. Students will then use high-tech equipment including 3-D printers, a laser engraver, and CNC router to produce their solutions. Students will learn how to document their work and communicate solutions to peers and members of the professional community. The major focus of the Engineering Design course is to expose students to the design process, research and analysis, collaboration skills, communication methods, global and human impacts, engineering standards, and technical documentation. Students may receive college credit and/or advanced standing for successful completion of this course and a cumulative exam.

## PLTW CIVIL ENGINEERING AND ARCHITECTURE (HONORS)

TEC261—SEMESTER 1  
OPEN TO 10-11-12

TEC262—SEMESTER 2  
FULL YEAR

PREREQUISITE: PLTW INTRODUCTION TO ENGINEERING DESIGN OR ENGINEERING DESIGN OR ARCHITECTURAL DESIGN

Students will learn the art and science of planning, designing and constructing buildings. The major focus of this course is completing long-term projects that involve the design and development of residential and commercial structures. Students will use 3-D architectural software to design solutions that solve major architectural issues. Students will design a small structure and a home to learn the basic construction systems such as wall, roof, foundation, water, and electrical systems. Students will visit an open lot in the surrounding community and will design a commercial structure for that specific lot. Within this project, students will learn about commercial construction systems, sustainable design, LEED, universal design, and structural engineering. Students may receive college credit and/or advanced standing for successful completion of this course and a cumulative exam.

## PLTW PRINCIPLES OF ENGINEERING (HONORS)

TEC301—SEMESTER 1  
OPEN TO 10-11-12

TEC302—SEMESTER 2  
FULL YEAR

PREREQUISITE: PLTW INTRODUCTION TO ENGINEERING DESIGN OR ENGINEERING DESIGN

Principles of Engineering is a survey course in which students will be introduced to several elements of engineering including mechanisms, energy, statics, materials, and kinematics. Students in Principles of Engineering will develop problem-solving skills and collaborate with others to complete design challenges. Students will be using various engineering programs to research and evaluate designs, create code for robotics, and develop virtual models of design solutions. Student projects will include: creating a bridge, designing a robotic material sorter, and programming and building a projectile launcher. Students may receive college credit and/or advanced standing for successful completion of this course and a cumulative exam.

## ELECTRICAL ENGINEERING (HONORS)

TEC291—SEMESTER 1  
OPEN TO 10-11-12

TEC292—SEMESTER 2  
FULL YEAR

PREREQUISITE: PLTW INTRODUCTION TO ENGINEERING DESIGN OR ENGINEERING DESIGN

Electrical Engineering is a full-year course that involves the study of electronic circuits that are used to process and control digital signals. Electrical Engineering is the foundation of all modern electronic devices such as cellular phones, MP3 players, and laptop computers. The major focus of the EE course is to expose students to the process of combinational and sequential logic design, teamwork, and communication methods. Students may receive college credit and/or advanced standing for successful completion of this course and a cumulative exam.

## PLTW COMPUTER INTEGRATED MANUFACTURING (HONORS)

TEC351—SEMESTER 1  
OPEN TO 10-11-12

TEC352—SEMESTER 2  
FULL YEAR

PREREQUISITE: PLTW INTRODUCTION TO ENGINEERING DESIGN OR ENGINEERING DESIGN

Manufactured items are part of everyday life, yet most students have not been introduced to the high tech, innovative nature of modern manufacturing. This course illuminates the opportunities related to understanding manufacturing. At the same time, it teaches students about manufacturing processes, product design, robotics, and automation. Students may receive college credit and/or advanced standing for successful completion of this course and a cumulative exam.

## PLTW ENGINEERING DESIGN AND DEVELOPMENT (HONORS)

TEC401—SEMESTER 1  
OPEN TO 11-12

TEC402—SEMESTER 2  
FULL YEAR

PREREQUISITE: PLTW DIGITAL ELECTRONICS OR ELECTRICAL ENGINEERING, PLTW PRINCIPLES OF ENGINEERING, PLTW COMPUTER INTEGRATED MANUFACTURING, OR PLTW CIVIL ENGINEERING AND ARCHITECTURE

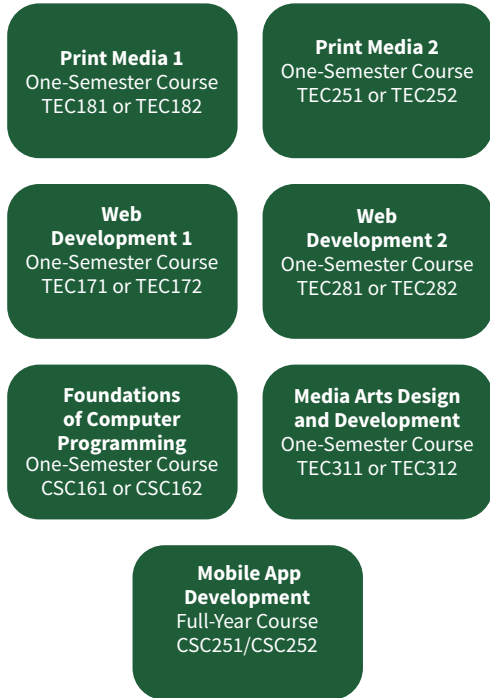
This capstone course allows students to spend a full year designing a solution to a problem of their choice. They have the chance to eliminate one of the “*Don’t you hate it when...*” statements of the world. This is an engineering research course in which students will work in teams to research, design, test, and construct a solution to an open-ended engineering problem. The product development life cycle and a design process are used to guide and help the team to reach a solution to the problem. The team presents and defends their solution to a panel of outside reviewers at the conclusion of the course. The EDD course allows students to apply all the skills and knowledge learned in previous Project Lead The Way (PLTW) courses. The use of 3-D design software, 3-D printers, laser engravers, CNC machines, and other tools lets students design physical prototypes of their solutions. This course also engages students in time management and teamwork skills, a valuable asset to students in the future.



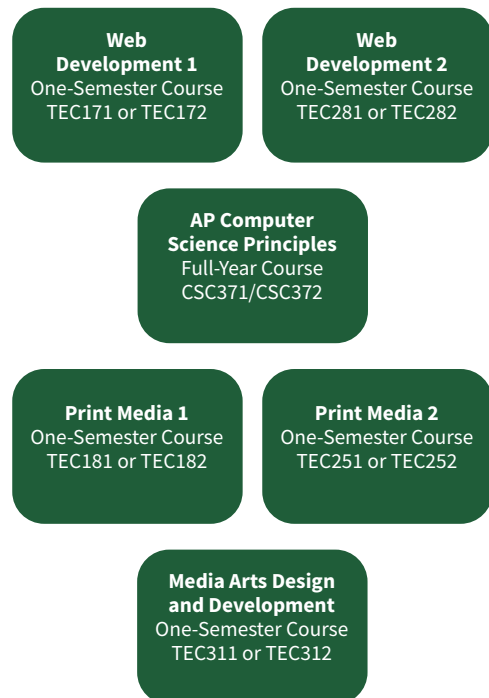
# TECHNOLOGY

TODAY, STUDENTS NEED TO BE PROFICIENT WITH TECHNOLOGY IN ALL ASPECTS OF THEIR PROFESSIONAL AND PERSONAL LIVES. THE TECHNOLOGY COURSES OFFERED WITHIN THIS PROGRAM ARE FOCUSED ON TEACHING STUDENTS THE KNOWLEDGE AND SKILLS THEY NEED TO ADAPT TO NEW TECHNOLOGY AS IT UNFOLDS. STUDENTS CAN FIND THEIR PASSION IN ONE OF THESE FOUR AREAS: PRINT MEDIA, WEB DEVELOPMENT, GAME DEVELOPMENT, AND VIDEO PRODUCTION.

## GRAPHIC COMMUNICATIONS PATHWAY



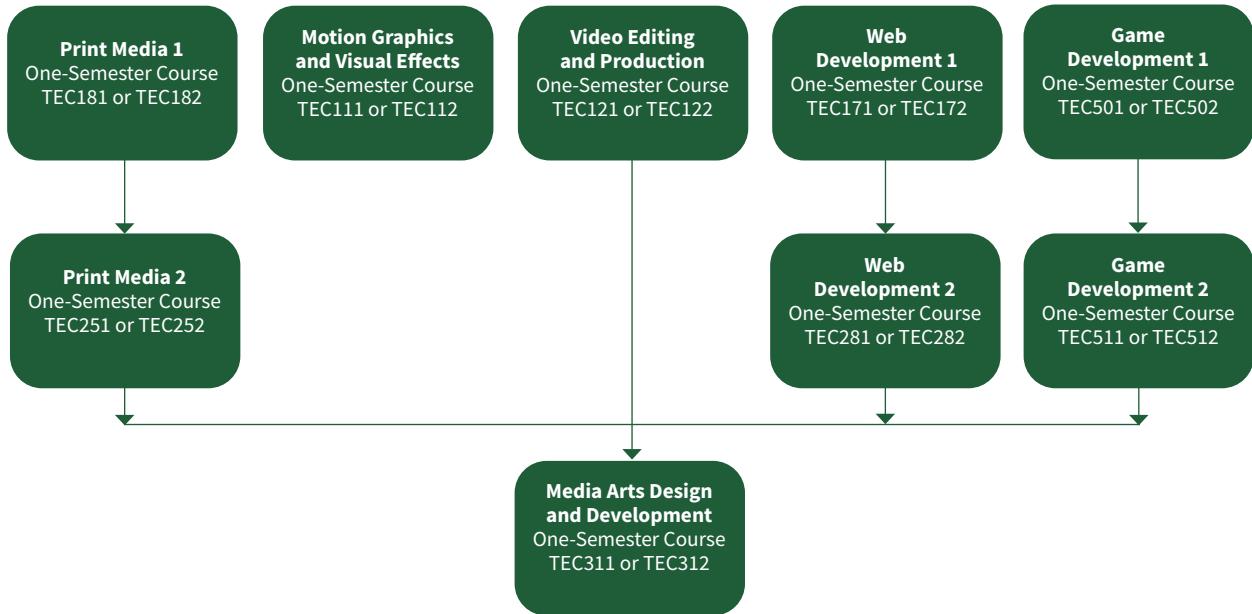
## WEB DEVELOPMENT PATHWAY



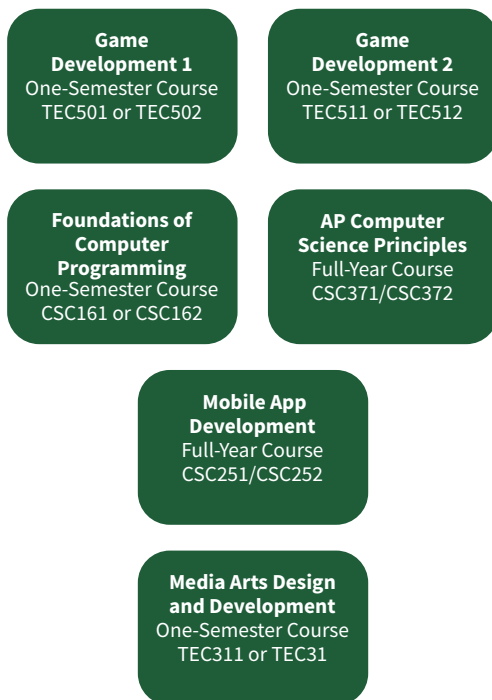
# TECHNOLOGY COURSE OFFERINGS

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## TECHNOLOGY DESIGN PATHWAY



## GAME DESIGN PATHWAY



## VIDEO PRODUCTION PATHWAY



## PRINT MEDIA 1 (COLLEGE PREP)

### GPA WAIVER OPTION

TEC181—SEMESTER 1

OPEN TO 9-10-11-12

PREREQUISITE: NONE

TEC182—SEMESTER 2

ONE SEMESTER

In Print Media 1, students will learn how to design and print t-shirts, buttons, notepads, calendars, packaging products, canvas posters, decals, and cell phone accessories. Students will be introduced to the basics of graphic design including digital image manipulation (Adobe Photoshop), digital illustration (Adobe Illustrator), and page layout (Adobe InDesign). Students will have the opportunity to operate professional printing equipment including a laser engraver, digital printer, wide format inkjet printer, flatbed inkjet printer, direct to garment printer, and a vinyl cutter.

## PRINT MEDIA 2 (COLLEGE PREP)

### GPA WAIVER OPTION

TEC251—SEMESTER 1

OPEN TO 9-10-11-12

PREREQUISITE: PRINT MEDIA 1

TEC252—SEMESTER 2

ONE SEMESTER

Print Media 2 will expand upon the topics of graphic design and print production creating more complex designs and products including a black t-shirt, multiple-colored decal, laser cut and engraved item of their choice, playing cards, and wall clings. Students will continue to use professional graphic design software (Photoshop, Illustrator, and InDesign) and print production equipment in a project-based learning environment where they will be able to think critically, problem-solve, and collaborate within the context of graphic communications.

## WEB DEVELOPMENT 1 (COLLEGE PREP)

### GPA WAIVER OPTION

TEC171—SEMESTER 1

OPEN TO 9-10-11-12

PREREQUISITE: NONE

TEC172—SEMESTER 2

ONE SEMESTER

Web Development 1 is the process of designing pages and writing code to create these pages. In this course, students will learn the fundamental applications of HTML5 and CSS by applying modern web development techniques. They will plan and create interactive web pages, while learning how to create animations and enhance images through Adobe Photoshop. Throughout the semester, students will construct and maintain a portfolio which will be used to highlight their work.

## WEB DEVELOPMENT 2 (COLLEGE PREP)

### GPA WAIVER OPTION

TEC281—SEMESTER 1

OPEN TO 9-10-11-12

PREREQUISITE: WEB DEVELOPMENT 1

TEC282—SEMESTER 2

ONE SEMESTER

In Web Development 2, students will continue their studies from Web Development 1 by applying modern web development techniques to create highly-responsive web 2.0 sites that maximize user experience. Students will take advantage of the jQuery framework to manipulate web content and create sophisticated transitions and effects. Students will learn how to create web animations, incorporate JavaScript into their websites, and explore app writing. Students will design and develop mobile apps that take advantage of mobile device technology such as the accelerometer, GPS, SMS, and camera functions.

## GAME DEVELOPMENT 1 (COLLEGE PREP)

### GPA WAIVER OPTION

TEC501—SEMESTER 1

OPEN TO 9-10-11-12

PREREQUISITE: NONE

TEC502—SEMESTER 2

ONE SEMESTER

This course introduces students to principles of game design by designing their own games using the Unreal Game Engine. Object-oriented programming will be introduced where students with no programming experience will make games from a variety of genres. Topics will include 3-D modeling, rigging, animating, lighting, camera angles, and texturing. Through the use of the Unreal Game Engine, students will implement controls, physics, collision detection, sound, animation, and memory management. Students will be working towards a game of their choice that could be released on mobile or computer platforms.

## GAME DEVELOPMENT 2 (COLLEGE PREP)

### GPA WAIVER OPTION

TEC511—SEMESTER 1

OPEN TO 9-10-11-12

PREREQUISITE: GAME DEVELOPMENT 1

TEC512—SEMESTER 2

ONE SEMESTER

This course will expand upon the principles of game design, learned in Game Development 1, and will introduce students to the advanced three-dimensional modeling and animation for game development using the Unreal Game Engine. Students will develop 3-D games individually and in teams, to be played on computers, virtual reality headsets, and mobile devices.

## MOTION GRAPHICS AND VISUAL EFFECTS (COLLEGE PREP)

### GPA WAIVER OPTION

TEC111—SEMESTER 1  
OPEN TO 9-10-11-12  
PREREQUISITE: NONE

TEC112—SEMESTER 2  
ONE SEMESTER

Motion Graphics and Visual Effects is an introduction to moviemaking with digital video and audio technologies.

The fundamental elements and techniques of filmmaking are explored from pre-production (planning and storyboarding) to production (cinematography, lighting, sound) to post production (editing, compositing, titles, audio, special effects). Students will use professional audio and video editing software (Adobe Premiere and Adobe Audition) to produce video shorts from conception to completion including: an interview, *Me and My Mini Me*, a scene recreation, artificial sound design, music video, newscast, and a public service announcement.

## VIDEO EDITING AND PRODUCTION (COLLEGE PREP)

### GPA WAIVER OPTION

TEC121—SEMESTER 1  
OPEN TO 9-10-11-12  
PREREQUISITE: AUDIO VIDEO DESIGN 1 (AKA MOTION GRAPHICS AND VISUAL EFFECTS)

TEC122—SEMESTER 2  
ONE SEMESTER

Video Editing and Production will allow students to continue working with professional digital video and audio editing software and expand knowledge through advanced use of software and digital video effects. Topics and projects will focus on sound creation, green screen editing, picture-in-picture effects, multicamera filming/editing and 3D-like effects through complex digital video production software.

## MEDIA ARTS DESIGN AND DEVELOPMENT

(COLLEGE PREP)

### GPA WAIVER OPTION

TEC311—SEMESTER 1  
OPEN TO 10-11-12

TEC312—SEMESTER 2  
ONE SEMESTER

PREREQUISITE: ANY ONE OR MORE OF THE FOLLOWING: VIDEO EDITING AND PRODUCTION, WEB DEVELOPMENT 2, GAME DEVELOPMENT 2, OR PRINT MEDIA 2

This course allows students the opportunity to learn advanced techniques outside of or beyond the scope of current course offerings in their particular area of specialization (audio/video design, web development, game development, or print media). Students collaborate with fellow students as well as industry professionals to design and create at least three original works: one to be entered in a student competition, one for a community client, and one for a service project. It is suggested that students take as many courses from the media arts course offerings before taking Media Arts Design and Development. Students who have taken any one of the Media Arts second-level classes are eligible to take this class. This course may be repeated and may also be taken as an Independent Study.