DESIGN TECHNOLOGY – MECHANICAL & MANUFACTURING

**JUSTIFICATION:**

This is an existing approved AS Degree/Certificate of Achievement. The DT Mechanical + Manufacturing COA currently include English and/or Speech requirement as required course for the Certificate.  We are removing this requirement as communication and presentational methods are taught within the courses to achieve course student learning outcomes as well as the communication outcome for the program.

Communication course requirement removal was approved by Advisory Meeting.

**Program Goals & Objectives**

Identify the goals and objectives of the program.

1. Apply design technology principles and processes to create original, comprehensive solutions to complex engineering design and fabrication problems.  
2. Utilize appropriate technologies and techniques to produce complex iterative prototypes within a digital workflow to meet industry standards and criteria.  
3. Communicate effectively using audience appropriate technical, graphical, oral and written formats in the critical evaluation of processes and products.  
4. Collaborate effectively in diverse teams to identify, analyze and solve technical problems of contemporary professional, societal and global importance.

**Catalog Description**

The Design Technology Mechanical Design & Fabrication program prepares students to work in mechanical design, industrial design, or manufacturing areas as entry level designers, virtual and rapid prototype builders, or Computer Aided Design (CAD)/Computer Aided Manufacturing (CAM) technicians. The program builds on the CAD Technician - Mechanical Design + Fabrication Certificate and leads to the Associate of Science degree, as well as providing a transfer pathway to Baccalaureate programs in Engineering Technology.  
  
The emphasis is on creating original solutions to engineering design technology problems through rigorous design and prototyping processes, using digital rapid prototyping technologies, within a collaborative, project-based environment consistent with advanced manufacturing industry demands of a globalized, sustainable economy.  
  
With a focus on communication skills and creative critical thinking, entry level students develop mechanical design solutions through research, prototyping, analysis and evaluation in an iterative process involving preliminary sketching, 2D and 3D CAD drawing and parametric modeling, rapid prototyping using 3D printing, laser cutting, CNC milling and forming, micro controllers and mechatronics. Advanced students develop complex design solutions integrating multiple technologies and procedures for real world application in competitions, entrepreneurial ventures and startups in an industry incubator model.  
  
The program includes integrated, contextualized academics, industry credentialing, interdisciplinary collaboration, professional development and work experience opportunities to develop long term transferable skills sets aligned to work force needs evidenced through advisory groups and industry engagement. Graduating students work under the supervision of qualified engineers, industrial designers, product designers or advanced manufacturing technicians at professional offices meeting customer requirements and deadlines by realizing products in a production system.  
  
This program prepares students for entry into high demand fields in advanced manufacturing, industrial design, engineering and specialized fabrication areas from aerospace to entertainment and medical technology.  Students gain associates and professional industry credentials in SolidWorks.

A Certificate of Achievement is awarded upon completion of all courses with a grade of C or better.

**Program Requirements**

Required units in the program: 18 minimum

\*\*NOTE: Highlighted courses in yellow in the “electives” category are preferred

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirements** | **Dept. Name/#** | **Name** | **Units** | **Sequence**  **Option A** |
| Required Core (13-15.5 units) | DT 008A  DT 008B  DT 008C  TECH 107A OR MATH 131 | Introduction to Digital Design and Fabrication  Intermediate Digital Design and Fabrication  Advanced Systems Design and Fabrication  Technical Calculations or  Intermediate Algebra for STEM | 3  3  4  3  5.5 | Yr 1, Fall  Yr 1, Spring  Yr 1, Summer  Yr 1, Fall |
| One or more Electives to meet 18 units for Certificate | DT 030  MIT 101  DT 101  ART 033A  MACH 101  WELD 200A  ELTN 130  ARCH 014  ART 036A  FASH 001A  ENGR 002  DT017  DT 118  DT 114 | Sustainable Technologies  Introduction to Robotics  Fabrication Laboratory  Product Design Applications  Beginning Metalworking Skills  Introduction to Structural Welding  Introduction to Electronics  Materials and Processes of Construction  Jewelry/Metal Fabrication  Fashion Survey  Engineering Graphics  Building Design & Construction Technical Graphics  3-Dimensional Building Design & Representation Building Information Modeling Design (BIM Design) | 3  4  1  3  3  6  3  2  3  3  3  3  3  3 | Yr 1, Spring  Yr 1, Spring  Yr 1, Fall  Yr 1, Spring  Yr 1, Spring  Yr 1, Spring  Yr 1, Spring  Yr 1, Fall  Yr 1, Spring  Yr 1, Spring  Yr 1, Spring  Yr 1, Spring  Yr 1, Fall  Yr 1, Spring |

Required Core: 13-15.5 units

Proposed Sequence

Year 1, Fall = 6 - 8.5 units

Year 1, Spring = 6 - 9 units

Year 2, Summer = 4 units

Total Units: 18 minimum units

**Master Planning**

The Design Technology Mechanical Design & Fabrication program prepares students to work in mechanical design, industrial design, or manufacturing areas as entry level designers, virtual and rapid prototype builders, or Computer Aided Design (CAD)/Computer Aided Manufacturing (CAM) technicians.

This program aligns with the following goals of the Educational Master Plan:

* Increase the median earnings and/or the regional living wage for students who exit the college.
* Align all degrees and certificates with appropriate workforce demand.
* Increase work-based learning opportunities.
* Create and sustain a culture of viable career pathways for all students

**Enrollment and Completer Projections**

**\*\*Showcased below are the “core” courses for the Certificate of Achievement**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | 2019-2020 | | 2020-2021 | |
| CB01: Course Department Number | CB02: Course Title | Annual # Sections | Annual Enrollment Total | Annual # Sections | Annual  Enrollment Total |
| DT 008A | Introduction to Digital Design and Fabrication | 8 | 179 | 10 | 184 |
| DT 008B | Intermediate Digital Design & Fabrication | 2 | 35 | 2 | 44 |
| DT 008C | Advanced Systems Design & Fabrication | 1 | 19 | 1 | 15 |
| TECH 107A OR  MATH 131 | Technical Calculations  Intermediate Algebra for STEM | 2  100 | 65  2490 | 6  6 | 137  124 |

The following AA degrees in Engineering Technology (of which Design Tech courses are elective options for) were awarded:

|  |  |
| --- | --- |
| 2019-2020 | 2020-2021 |
| 214 students | 236 students |

The following AS degrees in Design Technology – Mechanical & Manufacturing were awarded:

|  |
| --- |
| 2020-2021 |
| 2 students |

The following Certificate of Achievements were awarded:

|  |  |
| --- | --- |
| 2019-2020 | 2020-2021 |
| 6 students | 4 students |

This COA stacks upon the OSC “Cad Technician – Mechanical & Manufacturing”. The following students were awarded OSC’s for which this program stacks upon. It is important to note that these counts were during pandemic remote teaching environment and increase is expected in current hybrid teaching format. 8 students received OSC’s in 2020-2022 and we project that some of these OSC achievers will aim to take an additional two courses to receive this Certificate of Achievement.

|  |  |
| --- | --- |
| 2020-2021 | 2021-2022 |
| 2 students | 6 students |

Future years’ course enrollment and completions are projected to be in line with data provided from 2020-2021, with completions increasing around 5% per year.

* Projected Annual Program Completers: 8-15 per year

**Place of Program in Curriculum/Similar Programs**

Before completing this section, review the college’s existing program inventory in the CCC Curriculum Inventory, then address the following questions:

1. Do any active inventory records need to be made inactive or changed in connection with the approval of the proposed program? **No.**
2. Does the program replace any existing program(s) on the college’s inventory? Provide relevant details if this program is related to the termination or scaling down of another program(s). **No.**
3. What related programs are offered by the college? **N/A**

**Similar Programs at Other Colleges in Service Area**

There are a number of colleges offering Engineering Technology and/or Mechanical Design CAD Drafting courses. The LMI data shows that there does not appear to be a supply gap for the occupations of interest. However, the supply is within the COE’s acceptable margin (25% over or under the number of annual openings) and is therefore considered “supply met” rather than a “supply gap.” additionally, entry-level wages exceed the self-sufficiency standard in both Los Angeles and Orange Counties, and the Bureau of Labor Statistics lists an associate degree as the typical entry-level education for the occupations in this report.

The innovative aspect of this program includes creating original solutions to engineering design technology problems through rigorous design and prototyping processes, using digital rapid prototyping technologies such as laser cutting, 3D printing, vacuum forming, and CNC milling. Students work with advanced computer-aided design software to physically prototype design solutions. Students in this program gain the Solidworks Professional industry credential. According to Solidworks there are currently 32,328 people who have the CSWP certification which equates to 1.4% of all Solidworks users. Of the students that take the DT008C capstone course, we have continued to have a 90%+ success rate in CSWP certification.

\*\*Yellow highlighted are programs that are not aligned with our program.

|  |  |
| --- | --- |
| Cerritos | Mechanical Engineering Design Technician Certificate of Achievement |
| East LA | AS Engineering Graphics and Design Technology |
| El Camino | Computer-Aided Design Drafting Certificate of Achievement |
| Glendale | Engineering Technology – CAD & Design Drafting |
| LA Harbor | Programs are not similar (no computer-aided design drafting programs) |
| LA Pierce | Engineering Graphics and Design Technology Certificate of Achievement |
| LA Valley | Mechanical Drafting/Design Certificate. Program review looks to show only one computer-aided design course. Not applicable |
| Long Beach | Drafting - Mechanical Design Certificate of Achievement |
| Mt San Antonio | Industrial Design Engineering |