

# MT SAN JACINTO COMMUNITY COLLEGE

## ENGINEERING TECHNOLOGIST SUPPORT CERTIFICATE PROPOSAL

### 2nd READ

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#### **Item 1. Program Goals and Objectives**

Students will explore technology systems and engineering processes to learn how math, science, and technology impact our society. They will gain a basic understanding of the design process used in engineering fields and the application of computer modeling software. Students will learn the application of electronics in engineering technology, the integration of Engineering technology principles and automation in manufacturing environments, and the integration of engineering technology principles with civil and architectural applications.

Topics and skills the students will learn include, but are not limited to:

- The design process, communication and documentation, engineering systems, energy and power, statics, properties of materials, materials testing, control systems, quality assurance and engineering for reliability.
- Geometric relationships, visualization, technical sketching, modeling, model documentation, assemblies and production processes
- Safety, Ohm's Law, engineering notation, direct current circuits, capacitance, inductance, reactance, impedance, analog and digital waveforms, basic motors, number systems, logic gates, Boolean algebra, flip-flops, shift registers, and microprocessors.
- Techniques in computer simulation and electrical measurements.
- CIM processes of 3-D design and modeling, CNC programming and production, rapid prototyping, robotics and manufacturing systems.
- Civil and Architectural civil applications including historical understandings, career fields, residential design, commercial applications, commercial building design and public applications.
- A capstone project to design and construct solutions to engineering problems with emphasis placed on research methods, design problem statements, continuous improvement, cost analysis, prototyping, testing methods, project construction, and project presentation.

#### Department Program Goals and Objectives

- Develop highly transferable skills in collaboration, communication, and critical thinking, which are relevant for any coursework or career.
- Demonstrate knowledge and understanding of important characteristics of traditional manufacturing production methods including both basic engineering and technological aspects.
- Students will investigate topics such as aerodynamics and astronautics, biological engineering and sustainability, and digital electronics and circuit design.
- Utilize industry-leading technology and software in the engineering design process.
- Students will learn and apply the engineering design process.
- Students will be able to engage in open-ended problem solving.

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**Item 2. Catalog Description**

The coursework in this certificate uses project based learning curriculum from Project Lead the Way. It provides the framework for students to enter into an entry-level career in Engineering Technology, as a support person for an Engineering Technologist. Training received with completion of this certificate provides experience in various fields of engineering, such as, Electrical, Computer Integrated Manufacturing, Civil, and Architectural.

**Item 3. Program Requirements**

Complete all of the following courses (18 units):

ENGR 120 Principles of Engineering Technology	3
ENGR 121 Introduction to Engineering Design	3
ENGR 122 Electronics for Engineering Technologists	3
ENGR 123 Computer Integrated Manufacturing	3
ENGR 124 Civil Engineering and Architecture	3
ENGR 125 Engineering Design and Development	3
Total Units:	18

**Item 4. Master Planning**

The MSJC Engineering Advisory Committee recommends courses to ensure that entering workers have the foundational skills and knowledge to facilitate innovation and keep pace with technological change. The 2012-2013 Department Program review states that all fields of engineering are forecast for growth until 2020. Every effort we can do to provide students with engineering education will be beneficial. Providing this certificate will meet the identified program needs. The Department Program Review has also determined that utilizing industry-leading technology and software in the engineering design process is important to the success of our students. The courses leading to this certificate provide the framework needed in order for students to be prepared for entrance directly into the Engineering Technology Field. It also provides the foundation for pursuing a higher education Engineering degree. According to the US Bureau of Labor Statistics, most employers prefer to hire someone with an associate's degree or other postsecondary training in engineering technology and , electro-mechanical technicians typically need either an associate's degree or a postsecondary certificate, with projected job availability increases of 4- 5% 2012-2022. The certificate supports MSJC Mission Statement "To meet economic and workforce development needs, MSJC provides students with basic skills, general and career education that lead to transfer, associate degrees and certificates. Our commitment to student learning empowers students with the skills and knowledge needed to effect positive change and enhance the world in which we live."

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As recommended by committees involved in the Master Educational Planning Process, information obtained from other institutions literature reviews, and external consultant recommendations, MSJC has identified significant gaps in the existing STEM curriculum, lacking many sequence courses specific to engineering. Because of these curricular gaps, it is difficult for MSJC students to complete coursework to enter into the Engineering Field. Having a specific pathway of courses leading this certificate is critical to improving the academic success of our students wishing to pursue a career in Engineering Technology.

We have remodeled a classroom in the Technology Building at Menifee, room 969, to provide a location with appropriate workspace, computers and computer software, using SB 70 Funds. We will not need additional funding for facilities or resources at this time. We also will be able to utilized funding from the TAACCT –Regional Grant for items such as instructor training in “Project Lead the Way” specific curriculum.

In addition the College, local high school and employers in our service district within the Riverside County have been working in partnership for the past seven years to develop a program to educate/train our local residents (high school and college level) to fill our engineering and engineering technician employment needs. A partnership has been formed under the SB70 grant to develop the Project Lead the Way (PLTW). Two of our high school districts have adopted the PLTW curriculum program and Mt San Jacinto College will retool its engineering program to align with our k-12 partners. Over the past few years, we have had ongoing conversations with our partners about developing the PLTW program into a dual enrollment program to provide seamless transition from high school into the community college without duplication of coursework. El Camino Community College modeled this concept and Mt San Jacinto College began last year to review and develop the high school curriculum into college level classes. The program will start with this Engineering Technician certificate that will be taught as a dual enrollment model at the local high school.

There is not local competition for this award. Cerro Coso Community College is the only College in our region that we are aware of that is implementing a similar award, an Engineering Technician Certificate.

### **Item 5. Enrollment and Completer Projections**

Annual Completers	8.00	Net Annual Labor Demand	24.00
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Courses in the new program will be offered through the Engineering Technology Department. In the beginning the courses will be offered on the Menifee Valley campus scheduled during the day and evening. Students will be recruited from existing CSIS courses, community agencies, local high schools and students involved in current/recent engineering workshops and campus competitions.

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This program has been enthusiastically anticipated and is waiting for approval from the Curriculum Committee (it is at 2<sup>nd</sup> read) and the Board of Trustees. Once fully approved and implemented, we expect approximately 8 students to complete this paraprofessional training each year, with a goal of at least 10 receiving the certificate within 5 years.

Further, it is believed that the number of graduates will increase as the students and local community gain increasing awareness of the value and need for trained Engineering paraprofessionals in our local job market. Currently, the Net Annual Labor Demand is 24.

The initial number of sections of the courses to be offered annually is projected to be:

Number of Sections	Course Dept. Number	Title	Top Code	Chancellor's Office Data Mart Comparable CA CCD* Sections offered
1	ENGR 120	Principles of Engineering Technology	935	1-2
1	ENGR 121	Introduction to Engineering Design	953	2-4
1	ENGR 122	Electronics for Engineering Technologists	934	2-6
1	ENGR 123	Computer Integrated Manufacturing	956	2-8
1	ENGR 124	Civil Engineering and Architecture	953	2-7
1	ENGR 125	Engineering Design and Development	945	0-1

\* Cerro Coso (Kern CCD), Norco (Riverside CCD), Barstow, Chaffey, San Bernardino, Victor Valley

#### **Item 6. Place of Program in Curriculum/Similar Programs**

The new program will be housed in Technology Building (900) at Menifee and the Business and Technology Building (100) at San Jacinto. Mt. San Jacinto College has never had a program specifically focused on Engineering Technology.

We currently have a Surveying Employment Concentration Certificate, an Engineering Drafting Technology Certificate, an Engineering Drafting Technology Associate in Science. Our annual completer rates for '12-'13 & '13-'14: Surveying Employment Concentration Certificate was zero; Engineering Drafting Technology Certificate was zero; Engineering Drafting Technology Associate in Science was 3 in '12-'13 & 0 in '13-'14.

We have recently deactivated Green Collar manufacturing, Manufacturing QA, Small Wind, Solar PV, and Solar Thermal Employment Concentration Certificates due to low enrollment, low annual completers and with the advice of the Engineering Advisory board. The Engineering Technologist Support Certificate will fulfill the gap for engineering student focus of interest and employment needs in the Engineering Technology fields of Electrical, Computer Integrated Manufacturing, Civil, and Architecture. This certificate will be placed in the 2015/2016 MSJC Catalog under Engineering Technology along with our currently offered Certificate in Engineering: Drafting Technology.

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#### **Item 7. Similar Programs at Other Colleges in Service Area**

We are in Region 9, which also includes the following colleges: Barstow, Cerro Coso, Chaffey, Copper Mountain, Crafton Hills, Desert, Moreno Valley, Norco, Palo Verde, Riverside, San Bernardino, and Victor Valley.

Cerro Coso Community College is the only College in our region that we are aware of that is implementing a similar award, an Engineering Technician Certificate. Cerro Coso is 154 miles away from our College.

Norco has several variations of the award that are more specific toward individual sub-specialties and proved an Associate's Degree in Engineering Technology. The Certificates at Norco include a Civil Engineering Technician Certificate, a Drafting Technology Certificate, a Digital Electronics Certificate, and an Engineering Graphics Certificate. Norco is 45 miles away from our College.

Barstow has an Electronics Technology Certificate. Barstow is 105 miles away from our College.

Chaffey College has an Industrial Electrical Technology Program. They are 50 miles away from our College.

San Bernardino also has several variations of the award that are more specific toward individual sub-specialties. They have an Electronics Technology Certificate, a Communication Engineering Technology Certificate, an Electric Power Technology Certificate and a Computer Engineering Technology Certificate. They are 45 miles away from our College.

Victor Valley College has Associate Degrees in Electronics Engineering Technology and Electronics and Computer Technology. They are 80 miles away from our college.

Copper Mountain, Crafton Hills, Desert, Moreno Valley, Palo Verde, and Riverside City College do not offer a similar program.

Most of our regional colleges do not offer the program we are proposing that incorporates multiple disciplines and applications of Engineering Technology. In addition, the colleges are 45-150 miles away from our college and are not feasible for our students to commute to. The closest colleges with the most closely related programs are Norco College and San Bernardino College. Commuting to either institution is difficult and unlikely for our students.