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PROGRAM APPROVAL APPLICATION

NEW or SUBSTANTIAL CHANGE or LOCALLY APPROVED

(This application may not exceed 3 pages)

Fill In Form

Mechatronics and Automation Engineering Technology Proposed Program Title	1/24/2018 Projected Program Start Date
Irvine Valley College College	South Orange County Community College District District

Contact Information

Corine Doughty Voting Member	Dean, Instruction, Economic & Workforce Development Title
949-282-2730 Phone Number	cdoughty@ivc.edu Email

Goal(s) of Program (Check all that apply):

☒ Career Technical Education (CTE) ☒ Transfer ☐ Other

Type of Program (Check all that apply):

☐ Certificate of Achievement 12-17 (or 17-27 quarter) units ☒ Certificate of Achievement 18+ semester (or 27+ quarter) units

☒ Associate of Science Degree ☐ Associate of Arts Degree

Reason for Approval Request (Check One):

☒ New Program ☐ Substantial Change ☐ Locally Approved

Program Information

0956.00	Recommended Taxonomy of Program (TOP) Code
32	**Units for Major-Degree**
41	**Total Units for Degree Including Prerequisites**
32	**Required Units**

Written Form

1. **Insert the description of the program as it will appear in the catalog. (See PCAH pp. 142 and 170)**
   The Mechatronics and Automation Engineering Technology program prepares students to work as automation and robotics engineering technologists in all phases of industry where the control of production, distribution and/or manufacturing is conducted by an automated process. Graduates of the program may develop and test industrial process control systems, supervise the building and testing of prototypes, or supervise and conduct the installation and operation of such systems. They may calibrate operating systems and components, or write specifications, schedules and reports in addition to controlling schedules and budgets. They may also carry out research under the direction of scientists or engineers, set up and operate specialized test equipment, diagnose and analyze performance, troubleshoot and offer suggestions for improvement, and functionality of automated control systems. Students enrolled in the program will be required to complete courses in industrial electronics, digital circuit concepts, programming, PLC design, electrical engineering, robotics systems, and computer-aided modeling.

2. **Provide a brief rationale for the program.**

Mechatronics designers and automation engineering technicians use the principles and theories of science, engineering and mathematics to solve technical problems in research and development, manufacturing, inspection and maintenance. The work is typically a combination of technical, theoretical, and hands on skills to successfully measure, analyze, design, purchase, and construct automation systems for businesses. Engineering technicians may assist engineers and scientists, especially in research and development. They may also work in quality control departments, inspecting products and processes, conducting tests or collecting data. In manufacturing, they may assist in product design and development, process design or production. Others work with programmable logic controllers (PLCs), a growing field in the area of automation engineering technology that involves working with special-purpose computers to synchronize all of the technologies used for a manufacturing process. PLC professionals program set up and use these special-purpose computers. Automation engineering technology is applied to a wide variety of systems such as communications and process controls. Automation engineering technicians combine fundamental principles of mechanical engineering technology with knowledge of electrical and electronic circuits to design, develop, test and manufacture electrical and computer controlled mechanical systems, which are becoming the foundation of operation in industry. The automation industry is a branch of the electronics field and is one of the fastest growing areas of our national and international high-technology economy. It combines the fields of electronics, electrical, and mechanics and includes the interaction and control of motors, computers, pneumatics, hydraulics and other processes used in manufacturing. The Automation Engineering Technology program will serve the needs of the community by providing valuable career technical engineering focused on the needs of industry, in addition to providing highly articulated course credits which can be used to further students education in the field of engineering.

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3. **Summarize the Labor Market Information (LMI) and employment outlook (including citation for the source of the data) for students exiting the program. (See PCAH pp. 85-88, 136, 147, 148, 165, 168, and 176)**

According to the ***"Orange County Business Council's 2016-2017 Workforce Indicators Report",***

The New Economy has many definitions, but it is primarily characterized by emerging high-growth industries that use cutting-edge information technology, automation, robotics, artificial intelligence, and machine learning to transform traditional business processes, which have far-reaching impacts on the workforce. The ability of New Economy technology and business models to both create and destroy jobs is one most critical trends facing Orange County.

Particularly, Orange County needs to be proactive in responding to these disrupting forces:

- The rise of the sharing economy, online platforms or marketplaces that connect workers or sellers directly to customers;
- Cybersecurity and its inherent ramifications; and
- The impact of robotics, automation, and artificial intelligence.

Electrical and electronics engineering technicians had the largest number of jobs among these occupations with 6,439 in 2014. This occupation also had the highest median hourly wage at $28.45. However, this occupation is expected to undergo the greatest job loss – a loss of 73 jobs through 2019. Among these occupations, the only one not projected to lose jobs are mechanical engineering technicians with a gain of 13 jobs through 2019.

In 2014, there were a total of 631 job postings for engineering and robotics related occupations in the Los Angeles and Orange Counties. The top titles include: Electronics Technician, Test Technician, and Mechanical Technician.

Table 1 – Engineering and Robotics Occupations (by 2014 jobs)

SOC	Description	2014 Jobs	2019 Jobs	5-Year Change	5-Year % Change	Annual Openings	Median Hourly Earnings
17-3023	Electrical and Electronics Engineering Technicians	6,439	6,366	(73)	(1%)	166	$28.45
17-3027	Mechanical Engineering Technicians	1,974	1,987	13	1%	53	$26.95
17-3024	Electro-Mechanical Technicians	836	811	(25)	(3%)	21	$21.28
	Total / Average	**9,249**	**9,164**	**(85)**	**(1%)**	**240**	**$27.48**

Source: EMSI Employment Data – 2015.3

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4. **List similar programs at other colleges in the Los Angeles and Orange County Region which may be adversely impacted. (There is space for 10 listings, if you need more, please contact laocrc@rsccd.edu)**

College	Program	Who You Contacted	Outcome of Contact

Santiago Canyon College	Certificate of Proficiency Applied Robotics and Embedded Programming	"Ron Kelssler@kessler_ron@sccollege.edu Von Lawson Lawson_von@sccollege.edu	No conflict
El Camino College	Engineering Technology Certificate/AS Engineering Technology/Engineering Technical Certificate Industrial Techno	Eric Carlson, ecarlson@elcamino.edu Virginia Rapp Vrapp@elcamino.edu	No objections
Long Beach City College	Associates Degree in Electrical Technology	Scott Fraser, sfraser@lbcc.edu Mollie Smith msmith@lbcc.edu	No response
Santa Monica College	Certificate in Robotics & Artificial Intelligence	Fariba Bolandhemat, bolandhemat_fariba@smc.edu	No objections
Cerritos College	Engineering Technology - Electrical and Electronic Engineering Technician	Nick Real yreal@cerritos.edu	No conflict
Orange Coast College	Electronics	Lisa Knuppel lknuppel@occ.cccd.edu	No response
Los Angeles Harbor	Electromechanical Technology Certificate/AS Electronic Engineering Technology AS	Sandra Sanchez sanches@lahc.edu	No response
Los Angeles Valley	Engineering Technology: Industrial Certificate/AS Engineering Technology: Mechanical Engineering AS Mechanical Engineering Technology Certificate	Laurie Nalepa nalepal@lavc.edu	No response
Santa Ana College	Engineering Technology Certificate/AS	Kimberly Mathews Mathews_kimberly@sac.edu	No conflict
Cypress College		Steve Donley sdonley@cypresscollege.edu	No objections
Goldenwest College		David Gatewood Dgatewood2@gwc.cccd.edu	No response
Fullerton College		dbenoit@fullcoll.edu	No objections/supportive

5. **List all courses required for program completion, including core requirements, restricted electives and prerequisites. (There is space for 20 listings, if you need more, please contact laocrc@rsccd.edu). (See PCAH pp. 143 and 171)**
Total Unit Count = 41 Units (w/Prereqs) | Core Certificate Alone (wo/Pereqs)= 32 Units

Proposed Mechatronics and Industrial Automation Certificate of Achievement (A.S. Degree)		
Core Courses	**Course Number**	**Units**
C Programming	CS36	3
C++ Programming	CS37	3
Digital Electronic Circuits	ET99	4
Basic Electrical Circuits I	ET102	4
Industrial Electronics	ET116	4
Industrial Automation with PLCs	ET119	2
Introduction to Engineering Methods	ENGR7	4
Engineering Dynamics	ENGR80	3
Computer Aided Design Techniques	ENGR83	3
Engineering Research	ENGR100	2
Prerequisite Courses	**Course Number**	**Units**
Analytic Geometry & Calculus I (Prereq for PHYS 4A)	MATH3A	5
General Physics	PHYS4A	4
Totals (Including all Prerequisites)		**41**
Totals (Without Prerequisites)		**32**