CUYAMACA COLLEGE
ACADEMIC PROGRAM CHANGES FOR THE March 2019 For the 2019-2020 CATALOG

COURSE ADDITIONS

BUSINESS 113 – GIG ECONOMY: THE NEW ENTREPRENEURIAL PATH **2 UNITS**
Prerequisite: None
2 hours lecture
The course provides information and solutions for starting and working in the "GIG Economy" – mixing together short-term jobs, contract work, and freelance assignments. The class will assist students in other disciplines where gigging is common, such as music, ornamental horticulture, automotive, and graphic design, as well as, more traditional field of study such as business. The class will touch on freelancing, entrepreneurship, business and legal aspects, and tech developments, with emphasis on employment and entrepreneurial opportunities that exist in the industry.

CENTER FOR WATER STUDIES 206 – ADVANCED ELECTRICAL & INSTRUMENTATION PROCESSES **3 UNITS**
Prerequisite: "C" grade or higher or "Pass" in CWS 106 or equivalent
3 hours lecture
This course will be an advanced course in instrumentation, controls and SCADA industrial control systems. The focus will be on how these systems are used in the water and wastewater field. This course will cover PLC operations, usage and troubleshooting, how SCADA industrial control systems collect and store data, how the SCADA data historian works and is used by a water and wastewater utility. Finally, the course will look at intelligent equipment, communication standards and the underlying communication network.

CENTER FOR WATER STUDIES 207 – PRACTICAL SKILLS IN WATER & WASTEWATER SYSTEMS **2 UNITS**
Prerequisite: "C" grade or higher or "Pass" in CWS 107 or equivalent
1.5 hours lecture, 1.5 hours Laboratory
This course provides practical hands-on experience with the equipment and materials commonly used in the water and wastewater industry. Students will become familiar with and learn the specific uses of each piece of equipment commonly utilized in water distribution and wastewater collection systems. Students will have the opportunity to participate in hands-on learning activities and lessons related to the installation and maintenance of equipment and tools used in the water and wastewater industry. This course will utilize the Field Operation Skills Yard (FOSY) to provide a realistic learning environment for the students.

SOCIOLOGY 114 – INTRODUCTION TO THE SOCIOLOGY OF MINORITY GROUP RELATIONS **3 UNITS**
Prerequisite: None
3 hours lecture
An introduction to the sociological analysis of ethnicity, race, and immigration in a global context. Topics include the history of minority groups in the United States, patterns of interaction between racial and ethnic groups, colonialism, immigration, identity formation, prejudice, discrimination, racism, institutional racism, civil rights movements, and the intersection between race, social class, and gender.

SOCIOLOGY 140 - SEX AND GENDER ACROSS CULTURES **3 UNITS**
Prerequisite: None
3 hours lecture
An introduction to the sociological analysis of sex, gender, and sexual orientation in a variety of socio-economic and cultural contexts. The course examines the impact sex, gender, and sexual orientation have on the lives of men and women from different cultures in the areas of work, ethnicity, kinship, sexuality, politics, religion, health, arts, sports and communication. Gender and sexual relations in the contemporary USA are examined from the perspectives of different ethnic and racial groups.

SURVEYING 127 – SURVEY DRAFTING TECHNOLOGY **3 UNITS**
Prerequisite: "C" grade or higher or "Pass" in CADD 120 or equivalent
2 hours lecture, 4 hours laboratory
Professional Civil Engineering/Surveyor's office method drafting course that applies the basic skills and techniques acquired in CADD 115. Land surveying, land development procedures, legal descriptions, topographical analysis, earthworks, geographic control and subdivision processes will be covered. Also listed as CADD 127.

COURSE MODIFICATIONS

The following reflect changes in subject designator, course number and/or title, prerequisite/corequisite/recommended preparation, units, hours, and/or course description. Other areas (e.g., course objectives, course content, student learning outcomes, etc.) may also have been modified to meet Title 5 standards (reflected as "*Review and update of course outline*"). These modifications have been carefully reviewed by the Curriculum, General Education and Academic Policies and Procedures Committee.

PRESENT	PROPOSED CHANGES TO AREAS AS INDICATED
BIOLOGY 122 – THE SECRET LIFE OF PLANTS	*Review and update of course outline*
BUSINESS 110 – INTRODUCTION TO BUSINESS	*Review and update of course outline*
BUSINESS 115 – HUMAN RELATIONS IN BUSINESS	*Review and update of course outline*
CADD TECHNOLOGY 127 – SURVEY DRAFTING TECHNOLOGY Professional Civil Engineering/Surveyor's office method drafting course that applies the basic skills and techniques acquired in CADD 115. Land surveying, land development procedures, legal descriptions, topographical analysis, earthworks, geographic control and subdivision processes will be covered.	Professional Civil Engineering/Surveyor's office method drafting course that applies the basic skills and techniques acquired in CADD 115. Land surveying, land development procedures, legal descriptions, topographical analysis, earthworks, geographic control and subdivision processes will be covered. *Also listed as SURV 127.*
CENTER FOR WATER STUDIES 106 – ELECTRICAL & INSTRUMENTATION PROCESSES	*Review and update of course outline*
CHEMISTRY 231 – ORGANIC CHEMISTRY I	*Review and update of course outline*
COMPUTER AND INFORMATION SCIENCE 293 – WINDOWS SERVER–ADMINISTERING	*Review and update of course outline*
COMPUTER AND INFORMATION SCIENCE 294 – WINDOWS SERVER–ADVANCED CONFIGURATION	*Review and update of course outline*
ECONOMICS 110 – ECONOMIC ISSUES AND POLICIES	*Review and update of course outline*
ENGLISH AS A SECOND LANGUAGE ESL 050 – BASIC ACCELERATED READING AND WRITING FOR ENGLISH AS A SECOND LANGUAGE Prerequisite: Assessment into ESL 070, 080, or ESL 050	Prerequisite: Assessment into ESL 050
ENGLISH AS A SECOND LANGUAGE 1A – ACCELERATED READING AND WRITING FOR ENGLISH AS A SECOND LANGUAGE Prerequisite: Grade of "Pass" in ESL 080 or equivalent or assessment into ESL 096, 100 or 1A	Prerequisite: Grade of "Pass" in ESL 050 or equivalent or assessment into ESL 1A
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 100 – INTRODUCTION TO ENVIRONMENTAL AND OCCUPATIONAL SAFETY AND HEALTH (OSH) TECHNOLOGY	*Review and update of course outline*
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 110 – POLLUTION PREVENTION	*Review and update of course outline*
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 130 – ENVIRONMENTAL/OCCUPATIONAL HEALTH EFFECTS OF HAZARDOUS MATERIALS	*Review and update of course outline*
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 135 – GENERAL INDUSTRY SAFETY STANDARDS	*Review and update of course outline*
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 145 – CONSTRUCTION SAFETY STANDARDS	*Review and update of course outline*
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 150 – HAZARDOUS WASTE MANAGEMENT APPLICATIONS	*Review and update of course outline*
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 200 – HAZARDOUS MATERIALS MANAGEMENT (HMM) APPLICATIONS	*Review and update of course outline*
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 205 – SAFETY AND RISK MANAGEMENT ADMINISTRATION	*Review and update of course outline*
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 210 – INDUSTRIAL WASTEWATER AND STORMWATER MANAGEMENT	*Review and update of course outline*
ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT 215 – AIR QUALITY MANAGEMENT	*Review and update of course outline*

PRESENT	PROPOSED CHANGES TO AREAS AS INDICATED
MATHEMATICS 060 – JUST-IN-TIME SUPPORT FOR ELEMENTARY STATISTICS Prerequisite: Appropriate placement Co-requisite: Concurrent enrollment in MATH 160 at Cuyamaca College A review of the core prerequisite skills, competencies, and concepts needed in statistics. Intended for students who are concurrently enrolled in MATH 160, Elementary Statistics, at Cuyamaca College. Topics include concepts from arithmetic, pre-algebra, elementary and intermediate algebra, and descriptive statistics that are needed to understand the basics of college-level statistics. Concepts are taught through the context of descriptive data analysis. Additional emphasis is placed on solving and graphing linear equations and modeling with linear functions. Pass/No Pass only. Non-degree applicable.	**MATHEMATICS 060 – FOUNDATIONS FOR ELEMENTARY STATISTICS** Prerequisite: Appropriate placement Co-requisite: MATH 160 or PSY 215 This support course focuses on the skills and concepts needed for success in transfer-level statistics. This course is for students concurrently enrolled in statistics at Cuyamaca College. Students will receive extra support in arithmetic, algebra, problem solving, technology, and study skills. **Pass/No Pass only. Non-degree applicable.**
MATHEMATICS 076 – INTERMEDIATE ALGEBRA FOR MATH 176 Prerequisite: Appropriate placement Co-requisite: Concurrent enrollment in MATH 176 at Cuyamaca College A review of the core prerequisite skills, competencies, and concepts needed in pre-calculus. Intended for majors in science, technology, engineering, and mathematics who are concurrently enrolled in MATH 176, PreCalculus, at Cuyamaca College. Topics include: a review of computational skills developed in intermediate algebra, factoring, operations on rational and radical expressions, absolute value equations and inequalities, exponential and logarithmic expressions and equations, conic sections, functions including composition and inverses, an in-depth focus on quadratic functions, and a review of topics from geometry. This course is appropriate for students who are confident in their graphing and beginning algebra skills. A graphing calculator is required for this course. **Pass/No Pass only. Non-degree applicable.**	**MATHEMATICS 076 – FOUNDATIONS FOR PRECALCULUS** Prerequisite: Appropriate placement Co-requisite: MATH 176 Support for this course focuses on the skills and concepts needed for success in PreCalculus. This course is for students concurrently enrolled in PreCalculus (Math 176) at Cuyamaca College. Students will receive extra support in algebra, geometry, problem solving, technology, and study skills. **Pass/No Pass only. Non-degree applicable.**
MATHEMATICS 078 – INTERMEDIATE ALGEBRA FOR MATH 178 Prerequisite: Appropriate placement Co-requisite: Concurrent enrollment in MATH 178 at Cuyamaca College A review of the core prerequisite skills, competencies, and concepts needed in business calculus. Intended for majors in science, technology, engineering, and mathematics who are concurrently enrolled in MATH 178, Calculus for Business, Social and Behavioral Sciences at Cuyamaca College. Topics include: a review of computational skills developed in intermediate algebra, factoring, operations on rational and radical expressions, linear, exponential and logarithmic expressions and equations, an introduction to matrices, functions including composition and inverses, and an in-depth focus on quadratic functions. This course is appropriate for students who are confident in their graphing and beginning algebra skills. A graphing calculator is required for this course. *Not open to students with credit in MATH 180.* **Pass/No Pass only. Non-degree applicable.**	**MATHEMATICS 078 – FOUNDATIONS FOR CALCULUS FOR BUSINESS SOCIAL & BEHAVIORAL SCIENCES** Prerequisite: Appropriate placement Co-requisite: MATH 178 Support for this course focuses on the skills and concepts needed for success in Calculus for Business, Social & Behavioral Sciences (Math 178). This course is for students concurrently enrolled in Math 178 at Cuyamaca College. Students will receive extra support in algebra, geometry, problem solving, technology, and study skills. **Pass/No Pass only. Non-degree applicable.**
MATHEMATICS 110 – INTERMEDIATE ALGEBRA FOR BUSINESS, MATH, SCIENCE AND ENGINEERING MAJORS Prerequisite: Grade of "Pass" in MATH 090 or equivalent The second of a two-course sequence in algebra. This course completes some topics from the first course, such as factoring and operations on rational and radical expressions, and includes the addition of new topics such as absolute value equations and inequalities, exponential and logarithmic expressions and equations, conic sections, and an introduction to matrices and sequences and series. The concept of functions is developed including composition and inverses. Quadratic functions are covered in depth. Computational techniques developed in beginning algebra are prerequisite skills for this course. This course is appropriate for students with knowledge of beginning algebra or who have had at least two years of high school algebra but have not used it for several years. Graphing calculators are required for this course. *Maximum of 5 units can be earned for taking MATH 103 and 110.*	Prerequisite: Appropriate placement The second of a two-course sequence in algebra. This course completes some topics from the first course, such as factoring and operations on rational and radical expressions, and includes the addition of new topics such as absolute value equations, exponential and logarithmic expressions and equations, conic sections, and an introduction to matrices and sequences and series. The concept of functions is developed including composition and inverses. Quadratic functions are covered in depth. Computational techniques developed in beginning algebra are prerequisite skills for this course. This course is appropriate for students with knowledge of beginning algebra or who have had at least two years of high school algebra but have not used it for several years. Graphing calculators are required for this course.

PRESENT	PROPOSED CHANGES TO AREAS AS INDICATED
MATHEMATICS 120 – QUANTITATIVE REASONING Prerequisite: "C" grade or higher or "Pass" in MATH 096 or 103 or 110 or equivalent	Prerequisite: "C" grade or higher or "Pass" in MATH 096 or 110 or equivalent
MATHEMATICS 125 – STRUCTURE AND CONCEPTS OF ELEMENTARY MATHEMATICS I Prerequisite: "C" grade or higher or "Pass" in MATH 103 or 110 or equivalent	Prerequisite: "C" grade or higher or "Pass" in 110 or equivalent
MATHEMATICS 160 – ELEMENTARY STATISTICS Prerequisite: "C" grade or higher or "Pass" in MATH 096 or 103 or 110 or equivalent	Prerequisite: "C" grade or higher or "Pass" in MATH 096 or 110 or equivalent
MATHEMATICS 170 – ANALYTIC TRIGONOMETRY	*Review and update of course outline*
MATHEMATICS 175 – COLLEGE ALGEBRA Prerequisite: "C" grade or higher or "Pass" in MATH 110 or equivalent (MATH 103 does not meet the prerequisite)	Prerequisite: "C" grade or higher or "Pass" in MATH 110 or equivalent
MATHEMATICS 176 – PRECALCULUS: FUNCTIONS AND GRAPHS Prerequisite: "C" grade or higher or "Pass" in MATH 110 or equivalent (MATH 103 does not meet the prerequisite)	Prerequisite: "C" grade or higher or "Pass" in MATH 110 or equivalent
MATHEMATICS 178 – CALCULUS FOR BUSINESS, SOCIAL AND BEHAVIORAL SCIENCES Prerequisite: "C" grade or higher or "Pass" in MATH 110 or equivalent (MATH 103 does not meet the prerequisite)	Prerequisite: "C" grade or higher or "Pass" in MATH 110 or equivalent
MATHEMATICS 180 – ANALYTIC GEOMETRY AND CALCULUS I Graphic, numeric and analytic approaches to the study of analytic geometry, limits and continuity of functions, and introductory differential and integral calculus. Applications involving analysis of algebraic, exponential, logarithmic, trigonometric and hyperbolic functions from a variety of disciplines including science, business and engineering. First of three courses designed to provide serious science students with a solid introduction to the theory and techniques of analysis.	Graphic, numeric and analytic approaches to the study of analytic geometry, limits and continuity of functions, and introductory differential and integral calculus. Applications involving analysis of algebraic, exponential, logarithmic, trigonometric and hyperbolic functions from a variety of disciplines including science, business and engineering. First of three courses designed to provide math, science, and engineering students with a solid introduction to the theory and techniques of analysis.
PSYCHOLOGY 205 – RESEARCH METHODS IN PSYCHOLOGY Prerequisite: "C" grade or higher or "Pass" in PSY 120, 215 or equivalent	Prerequisite: "C" grade or higher or "Pass" in PSY 120, and 215 or Math 160 or equivalent
REAL ESTATE 193 – REAL ESTATE LEGAL ASPECTS Study of the law governing real property, its sale, lease, hypothecation or other conveyance. Instruments utilized in conveyance or lease of such property will be examined and prepared.	Study of the law governing real property, its sale, lease, hypothecation or other conveyance. Instruments utilized in conveyance or lease of such property will be examined.
SURVEYING 220 – BOUNDARY CONTROL AND LEGAL PRINCIPLES	*Review and update of course outline*

DISTANCE EDUCATION

Course	Title
BUS 113	GIG Economy: The New Entrepreneurial Path
ECON 110	Economic Issues and Policies
EHSM 100	Introduction to Environmental and Occupational Safety and Health (OSH) Technology
EHSM 110	Pollution Prevention
EHSM 130	Environmental/Occupational Health Effects of Hazardous Materials
EHSM 135	General Industry Safety Standards
EHSM 145	Construction Safety Standards
EHSM 150	Hazardous Waste Management Applications
EHSM 200	Hazardous Materials Management (HMM) Applications
EHSM 205	Safety and Risk Management Administration
EHSM 210	Industrial Wastewater and Stormwater Management
EHSM 215	Air Quality Management
RE 193	Real Estate Legal Aspects

DEGREE AND CERTIFICATE MODIFICATIONS

BUSINESS

CRAFT INDUSTRIES ENTREPRENEURSHIP
Certificate of Specialization

The Craft Industries program is designed to provide those entering this highly charged business environment with the basic skills to make it happen. Each student will build their business from the bottom up by understanding the standards and innovative solutions to the practical components of establishing any operational business model. The program is unique; it incorporates the traditional entrepreneurship theory mixed with down-to-earth tools and applications, while keeping in sight its ultimate goal of providing a means for the student to launch their craft business.

Program Learning Outcomes
Upon successful completion of this certificate, students will be able to:
- Demonstrated understanding of the Craft Industry's environment and its relationship to the many facets of entrepreneurship.
- Demonstrated competency in management practices, in particular business's role in achieving sustainability, and ethical and civic responsibility.

ENTREPRENEURSHIP OPPORTUNITIES
Small businesses that include:
Breweries and Brewpubs
Coffee Shops and Roasters
Artisan Foods
Cultivation and Production
Management
Handmade Textiles
Manufacturing and Production
Material Suppliers for Artisans

Certificate Requirements:
Core Curriculum:

Course	*Title*	*Units*
BUS 112	Craft Entrepreneur	2
BUS 111	Entrepreneurship: Starting and Developing a Business	3
BUS 125	Business Law: Legal Environment of Business	3
BUS 109	Elementary Accounting	3
~~BOT 132~~	~~Google Applications for Business~~	~~3~~
		~~14~~ 11

Select at least ~~three~~ four units from the following:

BOT 107	Office Systems and Procedures	2
BOT 114	Essential Word	1
BOT 115	Essential Excel	1
BOT 117	Essential PowerPoint	1
BOT 132	Google Applications for Business	3
BOT 151	Using Microsoft Outlook	1
		3
	Total Required	~~17~~ 15

CADD TECHNOLOGY

Occupational preparation in Computer-Aided Drafting and Design is the primary purpose of the CADD Technology degree program. Students are required to complete two core courses and to select from two potential career paths: Building Design Industry or Manufacturing Industry. Adherence to industrial practices and standards is stressed, including problem solving in a simulated industrial environment.

Program Learning Outcomes
Upon successful completion of this program, students will be able to:

- Create 3D modeling objects of various orientations including sections and elevations of objects, and identify the relationships of objects or object features to demonstrate visualization proficiency.
- Identify or describe the typical characteristics and uses of common construction or manufacturing materials, products and systems, document them in drawings, and make appropriate selections based on design project requirements.
- Use the latest version of 2D/3D CADD and Solid Modeling software programs (AutoCAD and SolidWorks) to create industry standard architectural or engineering drawings.
- Model the habits and attitudes for success in professional employment as a CADD technician including the preparation and presentation of a professional portfolio.
- Demonstrate computation, communication, critical thinking, and problem-solving skills to perform effectively as a CADD technician in the field of architecture and/or the civil, electronic, mechanical, structural, and surveying engineering fields.

CAREER OPPORTUNITIES
CAD Technician in the field of Architecture and Civil, Electronic, Mechanical, Structural, and Surveying Engineering

Associate in Science Degree Requirements:
Core Curriculum:

Course	*Title*	*Units*
CADD 115	Engineering Graphics	3
CADD 120	Introduction to Computer-Aided Drafting and Design	3
		6

Areas of Emphasis:

A. BUILDING DESIGN INDUSTRY

CADD/SURV 127	Survey Drafting Technology	3
CADD 131	Architectural Computer-Aided Drafting and Design	3
CADD 133	Advanced Architectural Computer-Aided Drafting and Design	3
CADD/OH 200	Introduction to Computer-Aided Landscape Design	3
		12

Select two of the following:

CADD 126	Electronic Drafting	3
CADD 128	Dimensioning and Tolerancing	3
CADD 132	Advanced Computer-Aided Drafting and Design in 3D Modeling	3
CADD/OH 201	Advanced Computer-Aided Landscape Design	3
		6
	Total Required Including Core Classes	24
	Plus General Education Requirements	

B. MANUFACTURING INDUSTRY
Select four of the following:

CADD/ENGR 125	3D Solid Modeling	3
CADD 126	Electronic Drafting	3
CADD 128	Dimensioning and Tolerancing	3
CADD/ENGR 129	Engineering Solid Modeling	3
CADD 132	Advanced Computer-Aided Drafting and Design in 3D Modeling	3
		12

Select two of the following:

CADD 127/SURV 127	Survey Drafting Technology	3
CADD 131	Architectural Computer-Aided Drafting and Design	3
CADD 133	Advanced Architectural Computer-Aided Drafting and Design	3
CADD/OH 200	Introduction to Computer-Aided Landscape Design	3
		6
	Total Required Including Core Classes	24
	Plus General Education Requirements	

Certificate of Achievement
Students who complete only the courses required for the major including an area of emphasis qualify for a Certificate in CADD Technology in that area of emphasis. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

CENTER FOR WATER STUDIES

II. WATER DISTRIBUTION OPERATIONS

Students in this major learn the methods, processes, technology, and current practices involved in operating and maintaining modern, complex water distribution systems. Students who satisfactorily complete the required courses for this certificate and/or degree program will qualify to take the CDPH Grade D-1 through D-5 Water Distribution Operator examinations required to obtain certification and employment with a water district.

Program Learning Outcomes

Upon successful completion of this program, students will be able to:

- Identify sources and characteristics of water common to water distribution systems.
- Compare and contrast the different types of water distribution systems currently used in the United States.
- Identify drinking water public health hazards and water quality standards common to the industry.
- Using calculations and conversions, determine water flow, pressure, volume, velocity and force, and chemical dosage used in water distribution systems.
- Identify and compare methods used to handle, install and repair water distribution pipe.
- Explain principles of pump operation for the types of pumps used in water distribution systems, including common problems, necessary adjustments, and typical packing gland problems.
- Explain the electrical principles involved in control circuits common to water distribution systems.
- Explain the required safe handling and storage of chlorine used in water distribution systems.
- Check and utilize water maps and drawings to determine location, type and characteristics of water distribution systems.
- Specify necessary procedures needed to safely complete field work in a water distribution system.
- Compare and contrast factors considered in the selection of pipe and different types of water meters.
- Demonstrate the ability to read meters and calculate the meter accuracy.

Program Requirements:

Course	*Title*	*Units*
CWS 100	Career Pathways in Water & Wastewater	3
CWS 101	Fundamentals of Water & Wastewater	3
CWS 102	Calculations in Water~~-~~& Wastewater	3
CWS 106	Electrical & Instrumentation Processes	3
CWS 107	Safety in Water & Wastewater	3
CWS 110	Laboratory Analysis for Water & Wastewater	3
CWS 130	Water Distribution Systems	3
CWS 134	Pumps, Motors, & Valves	3
CWS 204	Applied Hydraulics	3
CWS 230	Advanced Water Distribution Systems ~~II~~	3
		30

Select at least six units from the following:

CWS 103	Water Resources Management	3
CWS 105	Water Conservation	3
CWS 112	Water Treatment Plant Operations	3
CWS 115	Wastewater Reclamation and Reuse	3
CWS 132	Wastewater Collection Systems	3
CWS 206	Advanced Electrical & Instrumentation Processes	3
CWS 207	Practical Skills in Water & Wastewater Systems	2
CWS 210	Advanced Laboratory Analysis for Water & Wastewater	3
CWS 212	Advanced Water Treatment Plant Operations	3
CWS 232	Advanced Wastewater Collection Systems	3
CWS 270	Public Works Supervision	3
CWS 280	Backflow Tester Training	2
CWS 282	Cross-Connection Control Specialist	3
CWS 284	Cross-Connection Control Specialist–Recycled Water	3
CWS 290	Cooperative Work Experience	2
		6-7
	Total Required	36-37
	Plus General Education Requirements	

Certificate of Achievement

Students who complete only the major requirements above qualify for a Certificate in Water Distribution Operations. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

IV. WATER TREATMENT PLANT OPERATIONS

Students enrolled in this major learn the key steps, processes, and current technology involved in operating modern water treatment plants. Students who satisfactorily complete the required courses in this certificate and/or degree program will qualify to take the California Department of Public Health (CDPH) Grade T-1 and T-2 Water Treatment Plant Operator examinations required for certification and employment at water treatment plants.

Program Learning Outcomes

Upon successful completion of this program, students will be able to:

- Identify in detail characteristics and sources of ground water and surface water supplies including the chemical, physical and bacterial characteristics, and explain the effects on quality of geological formations, stratifications, and watershed management.
- Compare the basic principles of each water treatment process and list them in order performed.
- Identify and classify water distribution system components.
- Explain pump cavitation, corrosion, cross-connection, air valves, head loss and main flushing in relation to water and wastewater collection, distribution, and treatment.
- Compare and contrast the basic principles of each water treatment process and list them in order performed.
- Explain and prepare a plan for the use of chlorine including the characteristics of and methods for storing, feeding and measuring chlorine including the effects of moisture, pH and temperature on feed rate, and the health and safety effects, procedures and personal protective requirements.
- Determine the methods used for coagulation, flocculation and sedimentation including common chemicals used, feed systems, effects of time temperature, turbidity and pH, and the measurement of turbidity and color.
- Compare and contrast the six basic water quality parameters and explain in detail microbiological and chemical components, including sampling requirements and properties.
- Demonstrate through testing basic knowledge of the regulations for monitoring water quality and performing water treatment.
- Perform basic mathematical calculations and conversions relating to water flow, pressure, volume, velocity, chemical dosage, and hydraulic and organic loading.
- Determine appropriate safety procedures applicable to service and operation of water treatment and distribution systems including potential problems.

Program Requirements:

Course	*Title*	*Units*
CWS 100	Career Pathways in Water & Wastewater	3
CWS 101	Fundamentals of Water & Wastewater	3
CWS 102	Calculations in Water & Wastewater	3
CWS 106	Electrical & Instrumentation Processes	3
CWS 107	Safety in Water & Wastewater	3
CWS 110	Laboratory Analysis for Water & Wastewater	3
CWS 112	Water Treatment Plant Operations	3
CWS 134	Pumps, Motors & Valves	3
CWS 204	Applied Hydraulics	3
CWS 212	Advanced Water Treatment Plant Operations	3
		30
Select at least six units from the following:		
CWS 103	Water Resources Management	3
CWS 105	Water Conservation	3
CWS 114	Wastewater Treatment Plant Operations	3
CWS 115	Wastewater Reclamation and Reuse	3
CWS 130	Water Distribution Systems	3
CWS 206	Advanced Electrical & Instrumentation Processes	3
CWS 207	Practical Skills in Water & Wastewater Systems	2
CWS 210	Advanced Laboratory Analysis for Water & Wastewater	3
CWS 214	Advanced Wastewater Treatment Plant Operations	3
CWS 230	Advanced Water Distribution Systems	3
CWS 268	Membrane Plant Operation	3
CWS 270	Public Works Supervision	3
CWS 280	Backflow Tester Training	2
CWS 282	Cross-Connection Control Specialist	3
CWS 290	Cooperative Work Experience	2
		6-7
	Total Required	36-37
	Plus General Education Requirements	

Certificate of Achievement

Students who complete only the major requirements above qualify for a Certificate in Water Treatment Plant Operations. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

V. WASTEWATER COLLECTION SYSTEMS

Students completing the required courses for this major will qualify to take nearly a dozen wastewater related certification examinations offered by the California Water Environment Association (CWEA). Although current State regulations do not require certification of wastewater collection system personnel, many public sector employers either require or prefer job applicants who have obtained the CWEA Wastewater Collection and Maintenance certifications.

Program Learning Outcomes
Upon successful completion of this program, students will be able to:

- Define common terminology pertaining to collections system components, design, and management as well as inspection and quality control.
- Identify the types and functions of pipes and fittings used in wastewater collection system design and management.
- Given a wastewater collection map book, identify pipeline dimensions, pipe construction materials, direction of flow, and location of valves, services and lift stations.
- Describe in detail basic underground location and leak detection, trenching and shoring, and backfill and compaction methods of construction used in the field.
- Describe the nine basic cleaning methods and basic principles involved in hydraulic and mechanical cleaning methods.
- List and describe the operation of common valves used in a wastewater collection system.
- Perform basic mathematical computations and conversions relating to wastewater collection systems, pressure, volume, velocity, chemical dosage, and hydraulic and organic loading.

Program Requirements:

Course	*Title*	*Units*
CWS 100	Career Pathways in Water & Wastewater	3
CWS 101	Fundamentals of Water & Wastewater	3
CWS 102	Calculations in Water & Wastewater	3
CWS 106	Electrical & Instrumentation Processes	3
CWS 107	Safety in Water & Wastewater	3
CWS 132	Wastewater Collection Systems	3
CWS 134	Pumps, Motors & Valves	3
CWS 204	Applied Hydraulics	3
CWS 232	Advanced Wastewater Collection Systems	3
CWS 282	Cross-Connection Control Specialist	3
		30

Select at least six units from the following:

CWS 103	Water Resources Management	3
CWS 110	Laboratory Analysis for Water & Wastewater	3
CWS 112	Water Treatment Plant Operations	3
CWS 114	Wastewater Treatment Plant Operations	3
CWS 115	Wastewater Reclamation and Reuse	3
CWS 130	Water Distribution Systems	3
CWS 206	Advanced Electrical & Instrumentation Processes	3
CWS 207	Practical Skills in Water & Wastewater Systems	2
CWS 210	Advanced Laboratory Analysis for Water & Wastewater	3
CWS 214	Advanced Wastewater Treatment Plant Operations	3
CWS 230	Advanced Water Distribution Systems	3
CWS 270	Public Works Supervision	3
CWS 280	Backflow Tester Training	2
CWS 284	Cross-Connection Control Specialist–Recycled Water	3
CWS 290	Cooperative Work Experience	2
		6-7
	Total Required	36-37
	Plus General Education Requirements	

Certificate of Achievement
Students who complete only the major requirements above qualify for a Certificate in Wastewater Collection Systems. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

VI. WASTEWATER TREATMENT OPERATIONS

Students who complete the required courses for this certificate and/or degree program will qualify to take the SWRCB certification examination for the Grade I Wastewater Plant Operator as well as nearly a dozen wastewater related certification examinations offered by CWEA. There are over 80 wastewater treatment and reclamation facilities in San Diego County that are currently licensed and regulated by the SWRCB.

Program Learning Outcomes
Upon successful completion of this program, students will be able to:
- Describe wastewater collection system components.
- Identify the characteristics and sources of municipal sewage.
- Define wastewater collection system and wastewater treatment plant terminology.
- Describe the basic principles of conventional wastewater treatment.
- Compare and contrast wastewater treatment unit processes including preliminary, primary, secondary and tertiary treatment.
- Explain the basic principles of preliminary, primary, secondary and tertiary treatment.
- Perform basic mathematical calculations and conversions relating to water flow, pressure, volume, velocity, chemical dosage, and hydraulic and organic loading.
- Recognize and comment on safety procedures applicable to service and operation of wastewater collection and treatment systems, including potential problems.

Program Requirements:

Course	*Title*	*Units*
CWS 100	Career Pathways in Water & Wastewater	3
CWS 101	Fundamentals of Water & Wastewater	3
CWS 102	Calculations in Water & Wastewater	3
CWS 106	Electrical & Instrumentation Processes	3
CWS 107	Safety in Water & Wastewater	3
CWS 110	Laboratory Analysis for Water &-Wastewater	3
CWS 114	Wastewater Treatment Plant Operations	3
CWS 134	Pumps, Motors, & Valves	3
CWS 204	Applied Hydraulics	3
CWS 214	Advanced Wastewater Treatment Plant Operations	3
		30

Select at least six units from the following:

CWS 103	Water Resources Management	3
CWS 112	Water Treatment Plant Operations	3
CWS 115	Wastewater Reclamation and Reuse	3
CWS 130	Water Distribution Systems	3
CWS 132	Wastewater Collection Systems	3
CWS 206	Advanced Electrical & Instrumentation Processes	3
CWS 207	Practical Skills in Water & Wastewater Systems	2
CWS 210	Advanced Laboratory Analysis for Water & Wastewater	3
CWS 212	Advanced Water Treatment Plant Operations	3
CWS 232	Advanced Wastewater Collection Systems	3
CWS 268	Membrane Plant Operation	3
CWS 270	Public Works Supervision	3
CWS 280	Backflow Tester Training	2
CWS 282	Cross-Connection Control Specialist	3
CWS 284	Cross-Connection Control Specialist– Recycled Water	3
CWS 290	Cooperative Work Experience	2
		6-7
	Total Required	36-37
	Plus General Education Requirements	

Certificate of Achievement
Students who complete only the major requirements above qualify for a Certificate in Wastewater Treatment Operations. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

COMPUTER AND INFORMATION SCIENCE

WEB PROGRAMMING
Certificate of Specialization

These certificates offer specific training for either entry-level positions or to augment related programs such as Network Administration, Web Development, Business Office Technology or Graphic Design. The certificates are designed to demonstrate a relatively narrow expertise or skill area that may be used to attain a computer industry "niche" job.
Students who complete the requirements below qualify for a certificate in that area of emphasis. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

Program Learning Outcomes
Upon successful completion of this certificate, students will be able to:

- Develop attractive, usable, mobile-friendly websites using current development technologies such as HTML/CSS, JavaScript, PHP/MySQL, frameworks, and content management systems.

Certificate Requirements:

Course	*Title*	*Units*
CIS 211	Web Development I	3
CIS 213	Web Development II	3
CIS 215	JavaScript Web Programming	3
CIS 219	PHP/MySQL Dynamic Web-Based Applications	3
CS 119	Program Design and Development	3
~~CS 119L~~	~~Program Design and Development Lab~~	~~1~~
	Total Required	~~16~~ 15

SURVEYING
Associate in Science Degree

This degree program prepares students to enter the civil engineering field. Competency in care and operation of field instruments, solution of problems in the laboratory, drafting of land survey maps and civil engineering plans, and application of studies to field practice are thoroughly explored.

Program Learning Outcomes
Upon successful completion of this program, students will be able to:
- Measure angles and distances using electronic total stations and distance meters.
- Compile field data, adjusting for error from horizontal and vertical traverses.
- Create typical drawing title blocks accepted by local municipalities such as the City of San Diego.
- Calculate and plot contours and other features found on a topographic map.
- Plot easements using bearings, distances and curve information.
- Recognize and apply the appropriate vocabulary of boundary law in discussion, reading, and writing legal descriptions of boundary.
- Describe and solve advanced private boundary and public lands boundary problems.
- Solve introductory property boundaries using title reports and record maps.

CAREER OPPORTUNITIES
Geodetic Surveyor
Geophysical Prospecting Surveyor
Instruments Surveyor Assistant
Land Surveyor
Marine Surveyor
Mine Surveyor
Oil-Well Directional Surveyor

Associate in Science Degree Requirements:

Course	*Title*	*Units*
CADD 115	Engineering Graphics	3
	or	
ENGR 100	Introduction to Engineering and Design	4
CADD 120	Introduction to Computer-Aided Drafting and Design	3
MATH 170	Analytic Trigonometry	3
PHYC 110	Introductory Physics	4
SURV/CADD 127	Survey Drafting Technology	3
SURV/ENGR 218	Plane Surveying	4
SURV 220	Boundary Control and Legal Principles	3
SURV 240	Advanced Surveying	4
	Total Required	27-28
	Plus General Education Requirements	

Certificate of Achievement

Students who complete only the major requirements above qualify for a Certificate in Surveying. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.