

San Joaquin Delta College Catalog 00 - 01

Section II - Certificate Programs -

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CAREER GUIDE

Certificate Programs

This section includes all certificates offered currently by San Joaquin Delta College. The certificates are designed to provide applied training in specific occupational areas that will prepare students with employable skills in the prescribed certificate area. The certificates are recognized favorably by business and industry, and they are often required for job classification advancement.

Certificate Requirements

1. Each course must be completed with at least a minimum grade of “C.”
2. Equivalent courses from other accredited colleges verified by official transcript may be accepted upon approval of the division chairperson. The last 12 units of the certificate must be completed, in residence, at San Joaquin Delta College.
3. For those courses that require a skill-level prerequisite, students must have met the prerequisite skills successfully before enrolling in the course.

Application Procedure for Certificates

1. During the completing semester of the certificate program, file the Application for Certificate form with the division office responsible for the respective certificate program. These forms are available in the division office.
2. Applications must be filed by the deadline date as announced in the College's Academic Calendar. The Academic Calendar is published in the COLLEGE CATALOG.

CERTIFICATE PROGRAMS

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CERTIFICATE PROGRAMS (continued)

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AGRICULTURE BUSINESS CERTIFICATE

Total Units Required 44 - 49

Required Courses

AGBUS 10	Management Records	3
AGBUS 12	Agricultural Economics	3
AGBUS 15	Financial Accounting	3
AGBUS 46	Agricultural Marketing	3
AH SC 10/10L	Principles of Animal Science	4
PLANT 10/10L	Principles of Plant Science	4
ENG 1A	Written Communications	3
SPCH 1A	Fundamentals of Speech	3
C S 11	Computer Science Fundamentals	3
•MATH	See Group 1	3 - 4
ECON 1A	Principles of Economics (Macro)	3
••HIST	See Group 2	3
•••HUM	See Group 3	3
••••ELECTIVES	See Group 4	19 - 20

•Group 1 (Electives)

(one course from the following)

AG BUS 13	Agriculture Mathematics	3
MATH 80	Elementary Algebra	4

••Group 2 (History or Political Science)

(one course from the following)

HIST 17A	History of the U. S.	3
HIST 17B	History of the U. S.	3
POLSCI 1	American Government	3

•••Group 3 (Humanities)

(one course from Group III, Humanities, General Education requirement for the Associate degree) 3

••••Group 4 (Electives)

(minimum of 19 units from the following)

BIOL 1	Biology	4
CHEM 3A	Introduction to General Chemistry	4
OR		
CHEM 1A	General Chemistry	5
MATH 12	Introduction to Probability and Statistics	3
MATH 30	College Algebra	4
BUS 1A	Principles of Accounting	5

AGRICULTURE BUSINESS/ ANIMAL SCIENCE CERTIFICATE

Total Units Required 36

Required Courses

AGBUS 10	Management Records	3
AGBUS 12	Agriculture Economics	3
AGBUS 13	Agriculture and Natural Resources Math	3
AGBUS 15	Computers in Agriculture	3
AGBUS 46	Agriculture Marketing	3
AGBUS 96V	Work Experience	1
AH SC 10/10L	Basic Animal Science	4
AH SC 11A	Livestock Evaluation	2
AH SC 19	Feeds and Feeding	4
AH SC 21	Livestock Production	3
AH SC 25A	Livestock Husbandry Practicum	2
AH SC 25B	Livestock Husbandry Practicum	2
AH SC 34	Animal Health and Sanitation	3

AGRICULTURE BUSINESS/ PLANT SCIENCE CERTIFICATE

Total Units Required 38

Required Courses

AGBUS 10	Management Records	3
AGBUS 12	Agriculture Economics	3
AGBUS 13	Agriculture and Natural Resources Mathematics	3
AGBUS 15	Computers in Agriculture	3
AGBUS 46	Agriculture Marketing	3
AGBUS 96V	Work Experience	1
AGEGR 33	Equipment Operation & Maintenance	2
PLANT10/10L	Principles of Plant Science	4
PLANT 12	Economic Entomology	3
PLANT 13	Weeds & Crop Pests	3
PLANT 14	Soil Science	4
PLANT 36A	Deciduous Fruit & Grape Production	3
OH 22	Plant Propagation	3

AGRICULTURE MECHANICS CERTIFICATE

Total Units Required 34-37

Required Courses

AGEGR 20A Agriculture and Natural Resource Shop Skills 2

OR

INDUS 76 Tools and Measurements 3

AGEGR 21 Agriculture Welding 3

OR

MECH 10 Metallurgical Technology and Welding 4

AGBUS 13 Agriculture and Natural Resources Math 3

OR

INDUS 94 Industrial Mathematics 3

AGEGR 30A Introduction to Compact Engines 5

AGEGR 30B Beginning Compact Engines 5

AGEGR 30C Intermediate Compact Engines 5

AGEGR 33 Equipment Maintenance and Operations 2

AGEGR 96V Work Experience: Agricultural Engineering 2

INDUS 35 Mobile Hydraulics 4

•ELECTIVE See Group 1 3 - 4

•Group 1 (Electives)

(one course from the following)

AUTO 63 Fuel and Electrical Systems 3

DIESL 46 Diesel Engine Fuel and Tune-Up 3

MECH 15 Machine Tool Process 4

NATURAL RESOURCES MANAGEMENT CERTIFICATE

Total Units Required 38

Required Courses

N R 1 Introduction to Forestry 3

N R 2 Conservation of Natural Resources 3

N R 5 Park Systems and Management 3

N R 6 Introduction to Wild Life Management 4

N R 10 Introduction to Water Resources 3

PLANT 10/10L Introduction to Plant Science 4

PLANT 12 Economic Entomology 3

PLANT 14 Soil Science 4

AGBUS 13 Agriculture and Natural Resources

Mathematics 3

AGEGR 33 Equipment Operation and Maintenance 2

AGBUS 15 Computers in Agriculture 3

O H 22 Plant Propagation 3

ORNAMENTAL HORTICULTURE LANDSCAPE CERTIFICATE

Total Units Required 47

Recommended Sequence:

First Semester

O H 10 Introduction to Ornamental Horticulture 2

O H 21A Identification of Fall Plants 3

O H 37 Landscape Construction 3

PLANT 10 Principles of Plant Science 3

PLANT 10L Principles of Plant Science Laboratory 1

Second Semester

O H 21B Identification of Spring Plants 3

O H 71 Introduction to Plant Pests and Diseases 2

O H 62 Landscape Irrigation and Drainage 3

PLANT 14 Soil Science 4

Third Semester

AGBUS 13 Agriculture and Natural Resource Mathematics 3

O H 35 Landscape Maintenance 3

O H 69V Internship: Ornamental Horticulture 2

OR

O H 96V Work Experience: Ornamental Horticulture 2

PLANT 12 Economic Entomology 3

Fourth Semester

AGBUS 15 Agribusiness Computer Applications 3

O H 22 Plant Propagation 3

O H 26 Turf Practices 3

O H 40 Principles of Landscape Design 3

ORNAMENTAL HORTICULTURE NURSERY CERTIFICATE

Total Units Required 47

Recommended Sequence:

First Semester

O H 10	Introduction to Ornamental Horticulture	2
O H 21A	Identification of Fall Plants	3
O H 22	Plant Propagation	3
PLANT 10	Principles of Plant Science	3
PLANT 10L	Principles of Plant Science Laboratory	1

Second Semester

O H 21B	Identification of Spring Plants	3
O H 30	Introduction to Floriculture	3
O H 62	Landscape Irrigation and Drainage	3
PLANT 14	Soil Science	4

Third Semester

AGBUS 13	Agriculture and Natural Resource Mathematics	3
O H 29	House Plants and Interior Landscaping	3
O H 69V	Internship: Ornamental Horticulture	2
OR		
O H 96V	Work Experience: Ornamental Horticulture	2
PLANT 12	Economic Entomology	3

Fourth Semester

AGBUS 15	Agribusiness Computer Applications	3
O H 71	Introduction to Plant Pests and Diseases	2
O H 35	Landscape Maintenance	3
O H 40	Principles of Landscape Design	3

ORNAMENTAL HORTICULTURE: TURF GRASS CERTIFICATE (Proposed, Pending Approval)

Total Units Required 49

Recommended Sequence:

First Semester

O H 21A	Identification of Fall Plants	3
O H 71	Introduction to Plant Pest and Diseases	2
O H 37	Landscape Construction	3
PLANT 10	Principles of Plant Science	3
PLANT 10L	Principles of Plant Science Laboratory	1

Second Semester

O H 21B	Identification of Spring Plants	3
O H 23	Landscape Irrigation and Drainage	3
AGBUS 13	Agriculture and Natural Resources Mathematics	3
AGEGR 30A	Introduction to Compact Engines	5

Third Semester

AGEGR 33	Equipment Maintenance and Operations	2
PLANT 12	Economic Entomology	3
O H 35	Landscape Maintenance	3
O H 69V	Internship: Ornamental Horticulture	2
OR		
O H 96V	Work Experience: Ornamental Horticulture	2

Fourth Semester

AGBUS 15	Computers in Agriculture	3
O H 46	Turf Practices	3
O H 40	Principles of Landscape Design	3
PLANT 14	Soil Science	4

EMERGENCY MEDICAL TECHNICIAN CERTIFICATE EMT - 1

Total Units Required 4

Prerequisites to the Program

Current CPR certificate at health care provider level.

Required Courses

H S 77B	Emergency Medical Technician 1	4
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Recertification Prerequisites

- 1 Current EMT-I certificate.
- 2 Current CPR certificate at health care provider level.

Refresher Course

H S 81	EMT Refresher	1
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MOBILE INTENSIVE CARE NURSING (MICN) CERTIFICATE

Total Units Required 5

Prerequisites:

- 1 Must be a registered nurse (R.N.) with a minimum of one year of experience.

OR

- 2 Currently employed in an emergency room or a critical care area.
- 3 Current CPR or ACLS and successful completion of H S 34A, Basic Electrocardiograph Reading, or the equivalent.

Required Course

NURS 12	Mobile Intensive Care Nursing	5
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NURSE ASSISTANT CERTIFICATE

Total Units Required 5

Required Course

H S 70	Nurse Assistant Training	5
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PSYCHIATRIC TECHNICIAN CERTIFICATE

Total Units Required 41

Prerequisites:

BIO 11	Human Biology	4
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OR

ANAT 1	Human Anatomy	4
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OR

ANAT 2	Anatomy and Physiology	6
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H S 36	Medical Terminology and Speech	3
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FCS 19/H S 19	Human Development	3
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PSYCH 1	Introduction to Psychology	3
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Recommended Sequence:

First Semester (Spring)

PSYCH TECH 80	Foundations of Nursing	8.5
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PSYCH TECH 81	Introduction to Medical-Surgical Nursing	8.5
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Second Semester (Summer)

PSYCH TECH 82	Psychiatric Technician Nursing	8
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Third Semester (Fall)

PSYCH TECH 83	Advanced Psychiatric Technician Nursing	4.5
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PSYCH TECH 84	Developmental Disabilities Nursing	6
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PSYCH TECH 85	Advanced Developmental Disabilities Nursing	5.5
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PUBLIC HEALTH TECHNICIAN CERTIFICATE

Total Units Required 34 - 36

Recommended Sequence:

First Semester

H ED 1	Health Education	3
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H ED 28	Community Health	2
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FCS 2	Life Management	3
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ENG 1A	Written Communications	3
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OR

ENG 79	Preparatory English	5
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Second Semester

H S 19	Human Development	3
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H S 30	New Trends in Health Care	1
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H S 36	Medical Terminology and Speech	3
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BIM 7A	Beginning Word Processing: Concepts & Applications	3
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Third Semester

FCS 6	Nutrition	3
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PSYCH 53	Drugs and Society	3
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SOCIO 24	Social Welfare	3
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SOCIO 1A	Introduction to Sociology	3
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RADIOLOGIC TECHNOLOGY CERTIFICATE

Total Units Required 80.5

Prerequisites to the Program:

- 1 High school diploma with a 2.5 grade-point average for high school and college (if applicable), G.E.D. or High School Proficiency Certificate.
- 2 One year of high school algebra with at least a 2.0 grade-point average or an equivalent college course.
- 3 Qualified for English 1A (college assessment testing required unless an Associate degree or higher degree has been earned).
- 4 Completion of Health Science 36, Medical Terminology and Speech.
- 5 Completion of Anatomy 1, Human Anatomy.

Required Courses

Summer

RAD 10	Introduction to Radiography	3.5
RAD 10A	Beginning Clinical Laboratory	3

Fall

RAD 10B	Intermediate Clinical Laboratory	6
RAD 11	Radiographic Positioning and Terminology	6
RAD 12	Radiographic Anatomy	2
RAD 13	Principles of Radiographic Technique	4
RAD 14	Darkroom Chemistry and Processing	1

Spring

RAD 20	Advanced Radiographic Positioning and Terminology	4
RAD 20A	Advanced Clinical Laboratory	8
RAD 21	Advanced Radiographic Anatomy	2
RAD 22	Fundamentals of X-Ray and Radium Physics	4
RAD 23	Positioning and Technical Laboratory	0.5

Summer

RAD 30	Intermediate Positioning and Technical Laboratory	0.5
RAD 30A	Senior Clinical Laboratory	5

Fall

RAD 30B	Advanced Senior Clinical Laboratory	10
RAD 31	Advanced Positioning and Technical Laboratory I	1
RAD 32	Sectional Anatomy	2

Spring

RAD 40	Senior Review, and Advanced Radiation Protection and Fluoroscopic Systems	6
RAD 40A	Radiographic Laboratory	9
RAD 41	Radiographic Pathology and Film Critique	3

NOTE: The following electives are recommended, but they are not required.

PHSCI 1	Matter and Energy	3
PHYSC 2A	General Physics	4
PHYSC 2B	General Physics	4
BIOL 11	Human Biology	4
CHEM 3A	Introduction to Chemistry	4
POLSC 1	American Government and Institutions	3
OR		
HIST 17A	History of the United States	3
OR		
HIST 17B	History of the United States	3
PSYCH 1	Introduction to Psychology	3
BUS 30	Supervision and Human Relations	3
ENG 1A	Written Communications	3
H ED 31	Emergency Response	3
H ED 1	Health Education	3
PHYSC 10	Introduction to Physics	4

RESIDENT CARE HOME ADMINISTRATION CERTIFICATE

Total Units Required 30 - 32.5

Recommended Sequence:

First Semester

H S 72A	Care Provider Training: Mental Disabilities	1
H S 72B	Care Provider Training: Psychotropic Medications	1
H S 72C	Care Provider Training: Behavior Management	1
H S 72D	Care Provider Training: Normalization	1
H S 72E	Care Provider Training: Pre-Independent Living Training	1
H S 72F	Care Provider Training: Community Resources and Program Planning	1
ENG 1A	Written Communications	3
OR		
ENG 79	Preparatory English	5

Second Semester

H S 72G	Care Provider Training: Recognizing Other Needs of the Residents	1
H S 72H	Care Provider Training: Client Record Keeping	1
H S 72I	Care Provider Training: Nutrition	1
FCS 2	Life Management	3
H ED 30	Community First Aid and Safety	2
P E 39F	Adapted Conditioning	1.5

Third Semester

H S 19	Human Development	3
H S 36	Medical Terminology and Speech	3
FCS 5	Basic Nutrition	3
FCS 24	Adult Development and Aging	3

VOCATIONAL NURSING CERTIFICATE

Total Units Required 42

Prerequisites:

BIO 11	Human Biology	4
OR		
ANAT 1	Human Anatomy	4
OR		
ANAT 2	Anatomy and Physiology	6
H S 36	Medical Terminology and Speech	3
FCS 19/H S 19	Human Development	3
PSYCH 1	Introduction to Psychology	3

Recommended Sequence:

First Semester (Fall)

VOC NUR 1	Foundations of Nursing	8.5
VOC NUR 2	Introduction to Medical Surgical Nursing	8.5

Second Semester (Spring)

VOC NUR 3	Obstetrical Nursing	3.5
VOC NUR 4	Pediatric Nursing	3.5

Third Semester (Summer Intersession)

VOC NUR 5	Intermediate Medical/Surgical Nursing	9
VOC NUR 6	Advanced Medical/Surgical Nursing	9

AUTO BODY REPAIR CERTIFICATE

Total Units Required 42

Recommended Sequence:

First Semester

AUTO 84A	Introductory Auto-Body Repair	5
AUTO 81A	Introductory Auto-Body Repair Laboratory	1
MECH 10	Basic Welding for The Trades	4

Second Semester

AUTO 84B	Beginning Auto-Body Repair	5
AUTO 81B	Beginning Auto-Body Repair Laboratory	1
INDUS 94	Industrial Mathematics	3
INDUS 20	Industrial Safety & Health	3

Third Semester

AUTO 84C	Intermediate Auto-Body Repair	5
AUTO 81C	Intermediate Auto-Body Repair Laboratory	1
AUTO 64	Basic Engines	3

Fourth Semester

AUTO 84D	Advanced Auto-Body Repair	5
AUTO 81D	Advanced Auto-Body Repair Laboratory	1
INDUS 45	Industrial Technology	5

AUTO ELECTRIC TECHNOLOGY CERTIFICATE

Total Units Required 44-47

Recommended Sequence:

First Semester

AUTO 54	Starting and Charging Systems	5
INDUS 94	Industrial Mathematics	3

Second Semester

AUTO 55	Tune-Up and Engine Performance	5
INDUS 20	Industrial Safety and Health	3

Third Semester

AUTO 56	Fuel Management and Computer Control	7
INDUS 45	Industrial Technology	5

Fourth Semester

AUTO 57	Air Conditioning, Heating, and Electrical	5
*ELECTIVES See Group I Below		8.0

•**Electives(s):** (minimum of 8 units from the following. At least one course must be from List A)

List A

AUTO 50	Automatic Transmission and Transaxles	5
AUTO 51	Manual Drive Train and Axles	5
AUTO 52	Engine Rebuilding	7
AUTO 53	Brakes, Suspension, and Steering	7
DIESL 44	Diesel Engine Principles	3
DIESL 46	Diesel Engine Fuel and Tune-Up	3
DIESL 49	Computer Diagnosis and Troubleshooting	2

List B

AUTO 62	Brakes, Suspension, and Powertrain Systems	3
AUTO 63	Fuel and Electrical System	3
AUTO 64	Basic Engine	3

AUTOMOTIVE MASTER TECHNICIAN CERTIFICATE

Total Units Required 59-60

Required Courses

AUTO 52	Engine Rebuilding	7
AUTO 54	Starting and Charging Systems	5
INDUS 94	Industrial Mathematics	3
AUTO 51	Manual Drive Train and Axles	5
AUTO 55	Tune-Up and Engine Performance	7
INDUS 45	Industrial Technology	5

OR

INDUS 35	Mobile Hydraulics	4
AUTO 50	Automatic Transmission and Transaxles	5
AUTO 56	Fuel Management and Computer Control	7
MECH 10	Basic Welding for The Trades	4
AUTO 53	Brakes, Suspension, and Steering	7
AUTO 57	Air Conditioning, Heating, and Electrical	5

AUTOMOTIVE MASTER TECHNICIAN CERTIFICATE: APPRENTICESHIP OPTION

Total Units Required 40

Recommended Sequence:

First Semester

A-AUTO 50	Automatic Transmissions and Transaxles	5
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Second Semester

A-AUTO 51	Manual Drive Train and Axles	5
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Third Semester

A-AUTO 52	Engine Rebuilding	5
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Fourth Semester

A-AUTO 53	Brakes, Suspension, and Steering	5
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Fifth Semester

A-AUTO 54	Starting, Charging, and Electrical Systems	5
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Sixth Semester

A-AUTO 55	Ignition Systems and Electronic Engine Controls	5
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Seventh Semester

A-AUTO 56	Fuel Management and Computer Controls	5
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Eighth Semester

A-AUTO 57	Air Conditioning and Heating Electrical Systems	5
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AUTO MECHANICS TECHNOLOGY CERTIFICATE

Total Units Required 40 - 42

Required Courses

AUTO 50	Automatic Transmissions and Transaxles	5
AUTO 51	Manual Drive Train and Axles	5
AUTO 52	Engine Rebuilding	7
AUTO 53	Brakes, Suspension, and Steering	7
INDUS 35	Mobile Hydraulics	4
INDUS 94	Industrial Mathematics	3
MECH 10	Basic Welding for The Trades	4
•ELECTIVES	See Group 1	5 - 7

•Group 1 (Electives)

(one course from the following)

AUTO 54	Starting and Charging Systems	5
AUTO 55	Tune-Up and Engine Performance	5
AUTO 56	Fuel Management and Computer Control	7
AUTO 57	Air Conditioning, Heating, and Electrical	5

DIESEL CERTIFICATE

Total Units Required 40

Recommended Sequence:

First Semester

DIESL 41	Heavy Duty Brakes	3
DIESL 44	Diesel Engine Principles	3
DIESL 45	Diesel Engine Repair	4.5
MECH 10	Basic Welding for The Trades	4

Second Semester

DIESL 42	Heavy Duty Power Trains	3.5
DIESL 43	Heavy Duty Truck Components	3
DIESL 46	Diesel Engine Fuel and Tune-Up	3
DIESL 47	Diesel Air Conditioning	2
DIESL 49	Computer Diagnosis and Troubleshooting	2

Third Semester

AUTO 54	Starting and Charging Systems	5
INDUS 35	Mobile Hydraulics	4
INDUS 94	Industrial Mathematics	3

DIESEL-AUTOMOTIVE CERTIFICATE

Total Units Required 52

Recommended Sequence:

First Semester

DIESL 41	Heavy Duty Brakes	3
DIESL 44	Diesel Engine Principles	3
DIESL 45	Diesel Engine Repair	4.5
MECH 10	Basic Welding for Trades	4

Second Semester

DIESL 42	Heavy Duty Power Trains	3.5
DIESL 43	Heavy Duty Truck Components	3
DIESL 46	Diesel Engine Fuel and Tune-Up	3
DIESL 47	Diesel Air Conditioning	2
DIESL 49	Computer Diagnosis and Troubleshooting	2

Third Semester

AUTO 54	Starting and Charging Systems	5
INDUS 35	Mobile Hydraulics	4
INDUS 94	Industrial Mathematics	3

Fourth Semester

(minimum of 12 units from the following)

AUTO 50	Automatic Transmissions and Transaxles	5
AUTO 53	Brakes, Suspension, and Steering	7
AUTO 55	Tune-Up and Engine Performance	7
AUTO 57	Air Conditioning, Heating, and Electrical	5

SMALL ENGINE REPAIR TECHNOLOGY CERTIFICATE

Total Units Required 39 -41

Required Courses

SM ENG 30A	Small Engine Mechanics	5
OR		
AGEGR 30A	Introduction to Compact Engines	5
SM ENG 30B	Small Engine Mechanics	5
OR		
AGEGR 30B	Beginning Compact Engines	5
SM ENG 30C	Small Engine Mechanics	5
OR		
AGEGR 30C	Intermediate Compact Engines	5
SM ENG 30D	Small Engine Mechanics	5
OR		
AGEGR 30D	Advanced Compact Engines	5
INDUS 76	Tools and Measurement	3
MECH 10	Basic Welding for The Trades	4
INDUS 97	Industrial Relations	3
INDUS 20	Industrial Safety and Health	3
INDUS 94	Industrial Mathematics	3
OR		
INDUS 45	Industrial Technology	5
AUTO 62	Brake, Suspension, and Power Train Systems	3
OR		
AUTO 63	Fuel and Electrical Systems	3

ELECTRON MICROSCOPY CERTIFICATE BIOLOGICAL

Recommended Sequence:

First Semester (Fall)

C S 18B	Microcomputers and Small Business: Apple Macintosh	3
E M 11	Photography for Laboratory Technicians	2
E M 21	Techniques of Electron Microscopy	3
•MATH REQ.	See Group 1	4
BIOL 1	Core Biology	4

Second Semester (Spring)

E M 22	Ultramicrotomy for Electron Microscopy	4.5
CHEM 3A	Introduction to Chemistry	4
PHYS 10	Introduction to Physics	4
•MATH REQ.	See Group I	4 - 5

Third Semester (Fall)

E M 28	Cell Ultrastructure	2
E M 37	Biological Electron Microscopy Laboratory	3.5
E M 38	Scanning Electron Microscopy	3
E M 53	Electron Microscopy Equipment Maintenance	3
E M 58	Digital Imaging for Microscopy	2
•MATH REQ.	See Group 1	0 - 3

Fourth Semester (Spring)

E M 30	Current Microscopies	3
E M 39	Advanced Biological SEM	2
E M 59	Advanced Projects in Electron Microscopy	2

•Group 1 (Mathematics Requirement)

- Option 1: MATH 80, MATH 82, and MATH 31
Option 2: MATH 80 and MATH 87

Suggested Electives

E M 79	Applied Microscopy Principles	1-3
E M 34	Introduction to Materials Microscopy	4
E M 41	Analytical SEM	3
E M 50H	Special Study: Electron Microscopy	1 - 2
E M 62	Focused Ion Beam Operation/Use	2
E M 60	TEM Align/Use	2
E M 61	SEM Align/Use	2
E TECH 20	Materials & Statistics	3
MATH 12	Introduction to Probability and Statistics	4
ELECT 11	AC/DC Network Analysis	5
BIOL 33	Anatomy and Physiology	6
BIOL 2	General Zoology	5

Required Certificate Courses must be completed with at least a "C" Grade. All EM Courses in the certificate program must have been completed within four (4) years or have permission of the instructor.

Equivalent courses may be accepted by transfer from other colleges but at least 12 units of the certificate must be completed at San Joaquin Delta College. Students who desire equivalency/transfer course(s) credit for courses taken elsewhere must have the courses) approved BEFORE taking it for certificate credit.

NOTE: It is recommended that during the summer, required core courses (Non-EM) be taken.

ELECTRON MICROSCOPY CERTIFICATE CRYSTALLINE MATERIAL

Recommended Sequence:

First Semester (Fall)

C S 18B	Microcomputers and Small Business: Apple Macintosh	3
E M 11	Photography for Laboratory Technicians	2
E M 21	Techniques of Electron Microscopy	3
•MATH REQ.	See Group 1	4
PHYS 10	Introduction to Physics	4

Second Semester (Spring)

E TECH 20	Materials & Measurements	3
CHEM 3A	Introduction to Chemistry	4
E M 34	Introduction to Physical Electron Microscopy	2
•MATH REQ.	See Group I	4 - 5

Third Semester (Fall)

E M 35	Physical Electron Microscopy Laboratory	3.5
E M 38	Scanning Electron Microscopy	3
E M 53	Electron Microscopy Equipment Maintenance	3
E M 58	Digital Imaging for Microscopy	2
•MATH REQ.	See Group 1	0 - 3

Fourth Semester (Spring)

E M 30	Current Microscopies	3
E M 41	Analytical Scanning Electron Microscopy	3
E M 59	Advanced Projects in Electron Microscopy	2

•Group 1 (Mathematics Requirement)

- Option 1: MATH 80, MATH 82, AND MATH 31
Option 2: MATH 80 and MATH 87

Suggested Electives

E M 79	Applied Microscopy Principles	1-3
E M 62	Focused Ion Beam Operation/Use	2
E M 22	Ultramicrotomy for Electron Microscopy	4.5
E M 39	Advanced Biological SEM	2
E M 60	TEM Align/Use	2
E M 61	SEM Align/Use	2
C S 17	Computer Logic	3
ELECT 11	AC and DC Network Analysis	5
E TECH 13	Engineering Drafting Skills	3
MATH 12	Introduction to Probability and Statistics	3

Required Certificate Courses must be completed with at least a "C" Grade. All EM Courses in the certificate program must have been completed within four (4) years or have permission of the instructor.

Equivalent courses may be accepted by transfer from other colleges but at least 12 units of the certificate must be completed at San Joaquin Delta College. Students who desire equivalency/transfer course(s) credit for courses taken elsewhere must have the courses) approved BEFORE taking it for certificate credit.

NOTE: It is recommended that during the summer, required core courses (Non-EM) be taken.

ACCOUNTING CERTIFICATE

Total Units Required 35 - 35.5

Recommended Sequence:

First Semester

BUS 1A	Principles of Accounting	5
BUS 20	Introduction to Business	3
•ELECTIVES	See Group I Below	6

Second Semester

BUS 1B	Principles of Accounting	5
BUS 3	Financial Accounting	5
•ELECTIVES	See Group I Below	3

Third Semester

BUS 4	Managerial Accounting	5
•ELECTIVES	See Group I Below	3

Group I

(minimum of 12 units from the following)

BIM 1A	Beginning Keyboarding	1.5
BIM 31	Electronic Calculation	3

OR

BIM 32A,B,C	Beginning, Intermediate., and Advanced Office Calculation	3
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BUS 11	Income Tax Procedures	3
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BUS 13	Accounting on the Microcomputer	2
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BUS/CS 14	Microcomputers and Small Business Systems	3
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OR

CS 20	MicroSoft Word, Excel, and Access	3
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BUS 15	Computer Spreadsheets for Accounting	2
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BUS 18A	Business Law	3
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BUS 26	Economics of Business	3
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BUS 63	Analysis of Financial Statements	3
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BUS 67	Personal Finance	3
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BUS 70	Payroll Accounting	2
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BUS 71	Computerized Payroll Accounting	1
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BUS 81	California Income Tax Preparation	1
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BUS 82B,C	Business Mathematics 2, 3	4
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C S 11	Computer Science Fundamentals	3
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C S 19	Electronic Spreadsheets: Microcomputers	3
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ADMINISTRATIVE ASSISTANT CERTIFICATE

Total Units Required 34.5 - 36.5

Recommended Sequence:

First Semester

BUS 17A	Beginning Business Communications	3
BIM 2	Intermediate Keyboarding	3.5
BIM 42	Records Management Filing	3

Second Semester

BUS 1A	Principles of Accounting	5
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OR

BUS 10A	Bookkeeping	3
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BUS 17B	Advanced Business Communications	3
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BUS/C S 35	Multimedia Presentations	3
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BIM 7A	Beginning Word Processing: Concepts and Applications	3
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Third Semester

BUS 15	Computer Spreadsheet for Accounting	2
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BIM 7B	Intermediate Word Processing	3
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BIM 38	Office Technologies	3
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•ELECTIVES	See Group I Below	5
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Group I

(minimum of 5 units from the following)

BUS/C S 14	Micromputers and Small Business Systems	3
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BUS 30	Supervision and Human Relations	3
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BIM 23M	Beginning Desktop Publishing, Using PageMaker	2
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OR

BIM 23P	Beginning Desktop Publishing, Using PageMaker	2
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BIM 31	Electronic Calculation	2
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OR

BIM 32A,B,C	Beginning, Intermediate, and Advanced Office Calculation	3
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BIM 82	WordPerfect for Windows	2.5
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C S 43	Database Design: Micro	3
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C S 45	Microsoft Windows	1
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GUID 33	Job Seeking Skills	1
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SPCH 1A	Fundamentals of Speech	3
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OR

BUS 6	Business and Professional Speaking	3
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OR

SPCH 3	Interpersonal Communications	3
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OR

SPCH 7	Intercultural Communication	3
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BANK CUSTOMER SERVICE REPRESENTATIVE CERTIFICATE

Total Units Required 27.5-29.5

Recommended Sequence:

First Semester

BUS 61	Principles and Operations of Financial Institutions	3
BUS /C S 14	Microcomputers and Small Business Systems	3
OR		
C S 20	MicroSoft Word, Excel, and Access	3
BIM 31	Electronic Calculation	3
OR		
BIM 32A,B,C	Beginning, Intermediate, and Advanced Office Calculation	3
BUS 10A	Bookkeeping	3
OR		
BUS 1A	Principles of Accounting	5
BUS 94F	Customer Service Strategies	1

Second Semester

BUS 78	Introduction to Teller Training	1.5
BUS 22	Professional Selling	3
BUS 82A	Business Mathematics 1	2
BUS 82B	Business Mathematics 2	2
*ELECTIVES	See Group 1 Below	6

•Group 1 (Electives)

(minimum of 6 units from the following)

BUS 17A	Beginning Business Communication	3
BUS 18A	Business Law	3
BUS 20	Introduction to Business	3
BUS 66	Principles of Money and Banking	3
BUS 67	Introduction to Personal Finance	3
BIM 1A	Beginning Keyboarding	1.5
BIM 42	Records Management	3
SPCH 1A	Fundamentals of Speech	3
SPCH 7	Intercultural Communication	3

BANKING AND FINANCE CERTIFICATE

Total Units Required 30-32

Recommended Sequence:

First Semester

BUS 61	Principles of Financial Institution Operations	3
BUS 1A	Principles of Accounting	5
*ELECTIVE	See Group 1 Below	3

Second Semester

BUS 1B	Principles of Accounting	5
BUS 65A	Introduction to Personal Loans	1
BUS 65B	Introduction to Business Loans	1

Third Semester

BUS 63	Analysis of Financial Statements	3
OR		
BUS 3	Financial Accounting	5
*ELECTIVE	See Group 1 Below	3

Fourth Semester

BUS 66	Principles of Money and Banking	3
*ELECTIVE	See Group 1 Below	3

•Group 1 (Electives)

(minimum of 9 units from the following)

BUS 4	Managerial Accounting	5
BUS/C S 14	Microcomputers and Small Business Systems	3
OR		
C S 20	MicroSoft Word, Excel, and Access	3
BUS 17A	Beginning Business Communication	3
BUS 18A	Business Law	3
OR		
BUS 18B	Business Law	3
BUS 20	Introduction to Business	3
BUS 22	Professional Selling	3
BUS 26	Business Economics	3
BUS 42	Real Estate Finance	3
BUS 67	Introduction to Personal Finance	3

BOOKKEEPING CERTIFICATE

Total Units Required 23

Recommended Sequence:

First Semester

BUS 10A	Bookkeeping	3
BUS 82A	Business Mathematics 1	2
BUS 82B	Business Mathematics 2	2
BIM 32A	Beginning Office Calculation	1
BIM 32B	Intermediate Office Calculation	1
•ELECTIVES	See Group 1 or Group 2	3-5

Second Semester

BUS 10B	Bookkeeping	3
OR		
BUS 70	Payroll Accounting	2
AND		
BUS 71	Computerized Payroll Accounting	1
BUS 82C	Business Mathematics 3	2
BIM 32C	Advanced Office Calculation	1
•ELECTIVES	See Group 2	3-5

•Group 1 (Electives)

(minimum of 5 units from the following)

C S/BUS 14	Microcomputers and Small Business Systems	3
OR		
C S 20	Microsoft Word, Excel, and Access	3
C S 45	MicroSoft Windows	1
BUS 13	Accounting on the Microcomputer	2
BUS 72	Quickbooks	1.5
BIM 1A	Beginning Keyboarding	1.5

•Group 2 (Electives)

(minimum of 3 units from the following)

BUS 18A	Business Law	3
BUS 20	Introduction to Business	3
BUS 11	Income Tax Procedures	3
BUS 67	Introduction to Personal Finance	3

COMPUTER OPERATIONS CERTIFICATE

Total Units Required 28 - 30.5

Recommended Sequence:

First Semester

C S 11	Computer Science Fundamentals	3
C S 17	Computer Logic	3
C S 45	Microsoft Windows	1
*BIM 1A	Beginning Keyboarding	1.5

Second Semester

C S 54	Fundamentals of Data Communications	3
MATH 80	Elementary Algebra or above	3-5

Third Semester

C S 32	Computer Operations	3
ENG 72	Technical Writing	3
**ELECTIVE	See Group I Below	3-4

Fourth Semester

C S 33	Systems Analysis and Design	3
C S 75	Applied Computer Science Principles	2
OR		
C S 50H	Special Studies: Computer Science	2
OR		
C S 98V	Work Experience: Computer Science	2

***or a typing certificate for 40 words per minute or better**

••Group 1 (Electives)

(minimum of 3 units from the following)

C S 24A	COBOL Programming	3
C S 25A	ASSEMBLY Language Programming: Macro	3
C S 26	JAVA Programming	3
C S 27	Engineering FORTRAN	3
C S 28A	BASIC Programming	3
C S 28B	Visual BASIC Programming	3
C S 29	PASCAL Programming	4
C S 31	C Programming	3
C S 31B	C++ Programming	3
C S 42	UNIX	3

COMPUTER PROGRAMMING CERTIFICATE

Total Units Required 44 - 47.5

Recommended Sequence:

First Semester

C S 11	Computer Science Fundamentals	3
C S 17	Computer Logic	3
C S 45	Microsoft Windows	1
BUS 1A	Principles of Accounting	5
OR		
BUS 10A	Bookkeeping	3
*BIM 1A	Beginning Keyboarding	1.5

Second Semester

C S 25A	ASSEMBLY Language Programming: Macro	3
C S 54	Fundamentals of Data Communications	3
BUS 10B	Bookkeeping (required if BUS 10A selected)	3
MATH 20	Finite Mathematics	3
**ELECTIVE	See Group 1 Below	3

Third Semester

C S 32	Computer Operations	3
C S 75	Applied Computer Science Principles	2
OR		
C S 50H	Special Studies: Computer Science	2
OR		
C S 98V	Work Experience: Computer Science	2
ENG 72	Technical Writing	3
**ELECTIVE	See Group I Below	3

Fourth Semester

C S 33	Systems Analysis and Design	3
SPCH 3	Interpersonal Communication	3
***ELECTIVE	See Group 2 Below	3-4

***or a typing certificate of 40 words per minute or better**

****Group 1**

(one of the following combinations which includes a beginning and an advanced course in the same language)

C S 24A	COBOL Programming	3
C S 24B	Advanced COBOL Programming	3
OR		
C S 31	C Programming	3
C S 31B	C++ Programming	3
OR		
C S 28A	BASIC Programming	3
C S 28B	Visual BASIC Programming	3

*****Group 2**

(minimum of 3 units from the following)

C S 24A	COBOL Programming	3
C S 26	JAVA Programming	3
C S 27	Engineering FORTRAN	3
C S 28A	BASIC Programming	3
C S 29	PASCAL Programming	4
C S 31	C Programming	3
C S 42	UNIX	3

COMPUTER SCIENCE CERTIFICATE

Total Units Required 43-51

Recommended Sequence:

First Semester

C S 11	Computer Science Fundamentals	3
C S 17	Computer Logic	3
C S 29	PASCAL Programming	4
*MATH	See Group I Below	3-5

Second Semester

C S 25A	ASSEMBLY Language Programming: Macro	3
C S 31	C Programming	3
*MATH	See Group I Below	3-4
ENG 1A	Written Communications	3

Third Semester

C S 31B	C++ Programming	3
C S 33	Systems Analysis and Design	3
*MATH	See Group I Below	3-4
Speech 1A	Fundamentals of Speech	3

Fourth Semester

**ELECTIVES	See Group 2 Below	6-10
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***Group I (Mathematics)**

(minimum of three courses from the following)

MATH 1	Calculus	5
MATH 2	Calculus	4
MATH 3	Vector Calculus	4
MATH 4	Differential Equations	4
MATH 5	Linear Algebra	3
MATH 12	Introduction to Probability and Statistics	3
MATH 13	Survey of Calculus	3
MATH 20	Finite Mathematics	3

****Group 2 (Electives)**

(minimum of 6 to 10 units selected from the following)

BUS 1A	Principles of Accounting	5
BUS 1B	Principles of Accounting	5
BUS 4	Managerial Accounting	5
CHEM 1A	General Chemistry	5
C S 24A	COBOL Programming	3
C S 24B	Advanced COBOL Programming	3
C S 26	JAVA Programming	3
C S 27	Engineering FORTRAN	3
C S 32	Computer Operations	3
C S 42	UNIX	3
C S 43	Database Design: Micro	3
C S 54	Fundamentals of Data Communications	3
ECON 1A	Principles of Economics: Macro	3
PHYS 4A	Principles of Physics: Mechanics	4
PHYS 4B	Principles of Physics: Waves, Sound, and Thermodynamics	4
PHYS 4C	Principles of Physics: Electricity and Magnetism	4

**COMPUTER SCIENCE
MICROCOMPUTER
SPECIALIST
CERTIFICATE
Applications Emphasis**

Total Units Required 37 - 38

Recommended Sequence:

First Semester

C S 11	Computer Science Fundamentals	3
BUS/C S 14	Microcomputers and Small Business Systems	3
C S 45	MicroSoft Windows	1
C S 70	Introduction to Internet	1

Second Semester

C S 18B	Microcomputers and Small Business: Apple Macintosh	3
BUS 1A	Principles of Accounting	5
OR		
BUS 10A	Bookkeeping	3
ENG 72	Technical Writing	3

Third Semester

C S 14B	Microcomputer Evaluation and Installation	3
C S 20	MicroSoft Word, Excel, and Access	3
BIM 12D*	Introduction to WordPerfect for Windows	1
BIM 12E*	WordPerfect for Windows: Tips and Shortcuts	1
BIM 12F*	WordPerfect for Windows: Document Enhancement	1
BUS 10B	Bookkeeping (required if BUS 10A selected)	3

Fourth Semester

C S 19	Electronic Spreadsheets for Microcomputers	3
C S 42	UNIX	3
C S 43	Database Design: Micro	3

*BIM 82 may be substituted for BIM 12D, E, F.

**COMPUTER SCIENCE
MICROCOMPUTER
SPECIALIST
CERTIFICATE
Technical Emphasis**

Total Units Required 38 - 39

Recommended Sequence:

First Semester

C S 11	Computer Science Fundamentals	3
BUS/C S 14	Microcomputers and Small Business Systems	3
C S 45	Microsoft Windows	1
C S 70	Introduction to The Internet	1

Second Semester

C S 17	Computer Logic	3
BUS 1A	Principles of Accounting	5
OR		
BUS 10A	Bookkeeping	3
ENG 72	Technical Writing	3

Third Semester

C S 26	JAVA Programming	3
C S 29	PASCAL Programming	4
MATH 20	Finite Mathematics	3
BUS 10B	Bookkeeping (required if BUS 10A selected)	3

Fourth Semester

C S 31	C Programming	3
C S 42	UNIX	3
C S 54	Fundamentals of Data Communications	3

COMPUTER SCIENCE MICROCOMPUTER SPECIALIST CERTIFICATE

Applications and Technical Emphasis

Total Units Required 56 -57

Recommended Sequence:

First Semester

C S 11	Computer Science Fundamentals	3
BUS/C S 14	Microcomputers and Small Business Systems	3
C S 17	Computer Logic	3
C S 45	MicroSoft Windows	1
C S 70	Introduction to Internet	1

Second Semester

C S 18B	Microcomputers and Small Business: Apple Macintosh	3
C S 20	MicroSoft Word, Excel, and Access	3
BUS 1A	Principles of Accounting	5
OR		
BUS 10A	Bookkeeping	3
ENG 72	Technical Writing	3
MATH 20	Finite Mathematics	3

Third Semester

C S 14B	Microcomputer Evaluation and Installation	3
C S 19	Electronic Spreadsheets for Microcomputers	3
C S 26	JAVA Programming	3
BIM 12D*	Introduction to WordPerfect for Windows	1
BIM 12E*	WordPerfect for Windows: Tips and Shortcuts	1
BIM 12F*	WordPerfect for Windows: Document Enhancement	1
BUS 10B	Bookkeeping (required if BUS 10A selected)	3

Fourth Semester

C S 29	PASCAL Programming	4
C S 31	C Programming	3
C S 42	UNIX	3
C S 43	Database Design: Micro	3
C S 54	Fundamentals of Data Communications	3

*BIM 82 may be substituted for BIM 12D, E, F courses.

DATA ENTRY CERTIFICATE

Total Units Required 18.5 - 20

Recommended Sequence:

First Semester

BIM 1A	Beginning Keyboarding	1.5
BIM 1B	Exploring Word Processing	1.5
BIM 7A	Beginning Word Processing	3
BUS 10A	Bookkeeping	3
C S 45	MicroSoft Windows	1

Second Semester

BIM 70A, OR 70B, OR 70C	Beg. OR Inter., OR Adv. Keyboarding for Speed & Accuracy	1.5
BIM 31, OR BIM 32A, B, C	Electronic Calculation OR Beg., Inter., Adv. Office Calculation	3
BUS 13	Accounting on the Microcomputer	2
BUS 15 OR BIM 7B	Spreadsheets for Accounting OR Advanced Word Processing	2-3.5

DISTRIBUTION AND TRANSPORTATION SUPERVISOR CERTIFICATE

Total Units Required 22.5 - 24.5

Recommended Sequence:

First Semester

BUS 51	Introduction to Transportation	1.5
C S 11	Computer Science Fundamentals	3
OR		
C S/BUS 14	Microcomputers and Small Business Systems	3
OR		
C S 20	MicroSoft Word, Excel and Access	3
BUS 10A	Bookkeeping	3
OR		
BUS 1A	Principles of Accounting	5
**ELECTIVES	See Group 2 Below	3

Second Semester

*OPTION	See Group 1 Below	3
**ELECTIVES	See Group 2 Below	3

Third Semester

*OPTION	See Group 1 Below	3
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Fourth Semester

*OPTION	See Group 1 Below	3
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***Group 1 (Option)**

Required courses — may be taken in any sequence

BUS 56	Transportation: Export and Import	3
BUS 57	Physical Distribution and Warehousing	3
BUS 58	Transportation of Hazardous Materials	3

****Group 2 (Electives)**

(minimum of 6 units from the following)

BUS 17A	Beginning Business Communication	3
BUS 20	Introduction to Business	3
BUS 21	Marketing	3
BUS 30	Supervision and Human Relations	3
BUS 31	Introduction to Management	3
BUS 32	Total Quality Management	3
BUS 82A,B,C	Business Mathematics(any two)	2-2
BIM 39	Office Management	3

GENERAL OFFICE CERTIFICATE

Total Units Required 30.5 - 32.5

Recommended Sequence:

First Semester

BIM 2	Intermediate Keyboarding	3.5
BIM 7A	Beginning Word Processing: Concepts and Applications	3
BUS 1A	Principles of Accounting	5
OR		
BUS10A	Bookkeeping	3
BUS 17A	Beginning Business Communications	3
*ELECTIVES	See Group 1 Below	3

Second Semester

BIM 38	Office Technologies	3
BIM 42	Records Management and Filing	3
BUS 17B	Advanced Business Communications	3
*ELECTIVES	See Group 1 Below	6

•Group 1 (Electives)

(minimum of 9 units from the following)

BIM 7B	Intermediate Word Processing: Concepts and Application	3
BIM 31	Electronic Calculation	3
OR		
BIM 32A	Beginning Office Calculation	1
AND		
BIM 32B	Intermediate Office Calculation	1
AND		
BIM 32C	Advanced Office Calculation	1
BIM 50	Machine Transcription	2
OR		
BIM 95G	Transcription Techniques	1
BIM 70A	Beginning Keyboarding for Speed and Accuracy	1.5
BIM 70B	Intermediate Keyboarding for Speed and Accuracy	1.5
BIM 70C	Advanced Keyboarding for Speed and Accuracy	1.5
BIM 82	WordPerfect for Windows	2.5
BIM 95B	Electronic Filing	1
BIM 95D	Proofreading Techniques	1
BIM 95E	Telephone Techniques	1
BUS 13	Accounting on The Microcomputer	2
OR		
BUS 15	Computer Spreadsheets for Accounting	2
C S 45	Microsoft Windows	1
GUID 33	Job Seeking Skills	1
SPCH 1A	Fundamentals of Speech	3
OR		
SPCH 7	Intercultural Communication	3
OR		
SPCH 3	Interpersonal Communication	3

MERCHANDISING CERTIFICATE

Total Units Required 31 - 33

Recommended Sequence:

First Semester

BUS 1A	Principles of Accounting	5
OR		
BUS 10A	Bookkeeping	3
BUS 20	Introduction to Business	3
BUS 82A	Business Mathematics 1	2
AND		
BUS 82B	Business Mathematics 2	2
OR		
BUS 82B	Business Mathematics 2	2
AND		
BUS 82C	Business Mathematics 3	2

Second Semester

BUS 21	Marketing	3
BUS 30	Supervision and Human Relations	3
*ELECTIVE	See Group 1 Below	3

Third Semester

BUS 22	Professional Selling	3
BUS 23	Advertising	3
**ELECTIVES	See Group 2 Below	6

•Group 1 (Elective)

(one course from the following)

BUS 24	Retail Management	3
BUS 26	Economics of Business	3
SPCH 7	Intercultural Communication	3

Group 2 (Electives)

(two courses from the following)

BUS 10B	Bookkeeping	3
BUS 31	Introduction to Management	3
BUS/CS 14	Microcomputers and Small Business Systems	3
BUS 60	Small Business Management	3
PSYCH 1	Introduction to Psychology	3

OFFICE MANAGEMENT CERTIFICATE

Total Units Required 36.5 - 38.5

Recommended Sequence:

First Semester

BIM 2	Intermediate Keyboarding	3.5
BIM 42	Records Management and Filing	3
BUS 17A	Beginning Business Communications	3

Second Semester

BIM 7A	Beginning Word Processing: Concepts and Applications	3
BUS 1A	Principles of Accounting	5
OR		
BUS 10A	Bookkeeping	3
BUS 17B	Advanced Business Communications	3

Third Semester

BIM 38	Office Technologies	3
BUS 20	Introduction to Business	3
*ELECTIVES	See Group 1	3

Fourth Semester

BIM 39	Office Management	3
BUS/CS 35	Multimedia Presentations	3
*ELECTIVES	See Group 1	3

***Group 1 (Electives)**

(minimum of 6 units from the following)

BIM 7B	Intermediate Word Processing: Concepts and Applications	3
BIM 23M	Beginning Desktop Publishing, Using PageMaker	2

OR

BIM 23P	Beginning Desktop Publishing, Using PageMaker	2
BUS 14	Microcomputers and Small Business Systems	3

OR

CS 20	MicroSoft Word, Excel, and Access	3
BUS 8	Introduction to the American Legal System	3
BUS 15	Computer Spreadsheets for Accounting	2
BUS 30	Supervision and Human Relations	3
C S 45	MicroSoft Windows	1
GUID 33	Job Seeking Skills	1
SPCH 1A	Fundamentals of Speech	3

REAL ESTATE CERTIFICATE

Total Units Required 21 - 22

Recommended Sequence:

First Semester

BUS 40	Real Estate Principles	3
••ELECTIVE	See Group 2	3 - 4

Subsequent Semesters

•CORE		
REQUIRE	See Group 1 (Core Requirements)	12
••ELECTIVE	See Group 2	3 - 4

•Group 1 (Core Requirement)

(all of the following courses)

BUS 41	Real Estate Practice	3
BUS 42	Real Estate Finance	3
BUS 43	Legal Aspects of Real Estate	3

AND

(one course from the following)

BUS 44	Real Estate Appraisal	3
BUS 45	Real Estate Economics	3
BUS 49A	Basic Escrow Procedures	3

••Group 2 (Electives)

(minimum of 6 units from the following)

BUS 1A	Principles of Accounting	5
OR		
BUS 10A	Bookkeeping	3
BUS 3	Financial Accounting	4
BUS 8	Introduction to the American Legal System	3
OR		
BUS 18A	Business Law	3
OR		
BUS 18B	Business Law	3
BUS/C S 14	Microcomputers and Small Business Systems	3
BUS 22	Professional Selling	3
BUS 23	Advertising	3
BUS 46	Property Management	3
BUS 82A	Business Mathematics 1	2
AND		
BUS 82B	Business Mathematics 2	2
OR		
BUS 82B	Business Mathematics 2	2
AND		
BUS 82C	Business Mathematics 3	2
CONST 54	Estimating and Specifications	3

NOTE: BUS 40, Real Estate Principles, must be completed before qualifying to take the State examination for the sales license. Two additional courses must be completed within 18 months to retain the license. An applicant for broker licenses must have completed eight courses in addition to experience and other requirements. For additional information contact the Stockton Board of Realtors.

RISK MANAGEMENT AND INSURANCE CERTIFICATE

Total Units Required 35

Recommended Sequence:

First Semester

BUS 1A	Principles of Accounting	5
BUS 20	Introduction to Business	3
BUS 74	Introduction to Risk Management and Insurance	3
BUS/CS 14	Microcomputers and Small Business Systems	3
OR		
C S 20	MicroSoft Word, Excel, and Access	3

Second Semester

BUS 27	Financial Planning and Investments	3
BUS 67	Introduction to Personal Finance	3
BUS 17A	Beginning Business Communication	3
OR		
ENG 79	Preparatory English	5
OR		
ENG 1A	Written Communications	3
BUS 82C	Business Mathematics 3	2
*ELECTIVES	See Group 1 Below	3

Third Semester

*ELECTIVES	See Group 1 Below	6
BUS 69V	Internship: Business and Accounting	1

*Group 1 (Electives)

(minimum of 9 units from the following)

BUS 9	Ethical Issues in Business	3
BUS 8	Introduction to the American Legal System	3
OR		
BUS 18A	Business Law	3
OR		
BUS 19	Legal Environment of Business	3
BUS 11	Income Tax Procedures	3
BUS 21	Marketing	3
OR		
BUS 22	Professional Selling	3
BUS 94E	Telephone Techniques	1
BUS 94F	Customer Service Strategies	1
SPCH 1A	Fundamentals of Speech	3
OR		
SPCH 7	Intercultural Communication	3
MATH 10	Introduction to Contemporary Mathematics	3
OR		
MATH 12	Introduction to Probability and Statistics	3

SUPERVISION AND MANAGEMENT CERTIFICATE

Total Units Required 24 - 30

Recommended Sequence:

First Semester

BUS 1A	Principles of Accounting	5
OR		
BUS 10A	Bookkeeping	3
BUS 20	Introduction to Business	3
BUS 31	Introduction to Management	3
BUS 17A	Beginning Business Communication	3

Second Semester

BUS 18A	Business Law	3
BUS 30	Supervision and Human Relations	3
BUS/CS 14	Microcomputers and Small Business Systems	3

OR

C S 18B	Microcomputers and Small Business: Apple Macintosh	3
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OR

WAIVER	Demonstrated Computer Literacy	
*ELECTIVES	See Group 1	3
**ELECTIVES	See Group 2	3

***Group 1 (Electives)**

(minimum of 3 units from the following)

BUS 32	Total Quality Management	3
BUS 36	Personnel Management	3
BUS 60	Small Business Management	3

OR

BUS 94A	Small Business Start-Up	1
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AND

BUS 94B	Essential Topics for Small Business	1
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AND

BUS 94C	The New Entrepreneur	1
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****Group 2 (Electives)**

(minimum of 3 units from the following)

BUS 18B	Business Law	3
BUS 26	Economics of Business	3
BUS 73A	Leadership for Supervisors	1
BUS 73B	Recruiting and Selecting Employees	1
BUS 82A	Business Mathematics 1	2
AND		
BUS 82B	Business Mathematics 2	2
BIM 39	Office Management	3
SPCH 7	Intercultural Communication	3

TAX PREPARATION CERTIFICATE

Total Units Required 30

Recommended Sequence:

First Semester

BUS 1A	Principles of Accounting	5
*ELECTIVES	See Group 1 Below	6

Second Semester

BUS 1B	Principles of Accounting	5
BUS 3	Financial Accounting	5
BUS 11	Income Tax Procedures	3
BUS 81	California Income Tax Preparation	1

Third Semester

BUS 4	Managerial Accounting	5
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•Group 1 (Electives)

(minimum of 6 units from the following)

BUS 13	Accounting on the Microcomputer	2
BUS/CS 14	Microcomputers and Small Business Systems	3
BUS 18A	Business Law	3

OR

BUS 19	Legal Environment of Business	3
BUS 20	Introduction to Business	3
BUS 26	Economics of Business	3
BUS 82B	Business Mathematics 2	2

AND

BUS 82C	Business Mathematics 3	2
BIM 31	Electronic Calculation	3

OR

BIM 32A	Beginning Office Calculation	1
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AND

BIM 32B	Intermediate Office Calculation	1
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AND

BIM 32C	Advanced Office Calculation	1
C S 11	Computer Science Fundamentals	3

TRAFFIC SHIPPING AND RECEIVING CLERK CERTIFICATE

Total Units Required 14.5 - 16.5

Recommended Sequence:

First Semester

BIM 32A	Beginning Office Calculation	1
BUS 51	Introduction to Transportation	1.5
C S 11	Computer Science Fundamentals	3
OR		
BUS/CS 14	Microcomputers and Small Business Systems	3
OR		
C S 20	MicroSoft Word, Excel, and Access	3
BUS 10A	Bookkeeping	3
OR		
BUS 1A	Principles of Accounting	5

Second Semester

*ELECTIVE	See Group 1 Below	3
**ELECTIVE	See Group 2 Below	3

***Group 1 (Elective)**

(minimum of 3 units from the following)

BUS 56	Transportation: Export and Import	3
BUS 57	Physical Distribution and Warehousing	3
BUS 58	Transportation of Hazardous Materials	3
BUS 69V	Internship: Business and Accounting	1-8

****Group 2 (Elective)**

(minimum of 3 units from the following)

BUS 82A	Business Mathematics 1	2
AND		
BUS 82B	Business Mathematics 2	2
OR		
BUS 82B	Business Mathematics 2	2
AND		
BUS 82C	Business Mathematics 3	2
BIM 38	Office Technologies	3
BIM 39	Office Management	3
BIM 42	Records Management and Filing	3
ENG 79	Preparatory English	5
SPCH 7	Intercultural Communication	7

WORD PROCESSING/ DESKTOP PUBLISHING CERTIFICATE

Total Units Required 32.5

Recommended Sequence:

First Semester

BIM 2	Intermediate Keyboarding	3.5
BIM 7A	Beginning Word Processing: Concepts and Applications	3
BUS 17A	Beginning Business Communications	3
C S 18B	Microcomputers and Small Business: Apple Macintosh	3
BIM 23M	Beginning Desktop Publishing, Using PageMaker OR	2
BIM 23P	Beginning Desktop Publishing, Using PageMaker	2
*ELECTIVES See Group 1 Below		2

Second Semester

BUS 17B	Advanced Business Communications	3
BIM 7B	Intermediate Word Processing: Concepts and Applications	3
BIM 8	Desktop Publishing Using Word Processing Software	3
BUS/CS 35	Multimedia Presentations	3
*ELECTIVES See Group 1 Below		4

***Group 1 (Electives)**

(minimum of 6 units from the following)

BIM 50	Machine Transcription	2
OR		
BIM 82	WordPerfect for Windows	2.5
BIM 95G	Transcription Techniques	1
BIM 95D	Proofreading Techniques	1
C S 45	MicroSoft Windows	1
ENG 72	Technical Writing	3
GUID 33	Job Seeking Skills	1
SPCH 7	Intercultural Communication	3
OR		
SPCH 3	Interpersonal Communication	3
OR		
SPCH 1A	Fundamentals of Speech	3

ARCHITECTURAL DRAFTING CERTIFICATE

Total Units Required 40

Recommended Sequence:

First Semester

ARCH 1	Basic Architectural Drafting	3
ARCH 8	Materials of Construction	3

Second Semester

ARCH 9	Design Fundamentals	3
ARCH 12	Computer Aided Drafting	3
CONST 89	Methods and Planning	3
MATH 80	Elementary Algebra	4

Third Semester

E TECH 22	Three Dimensional Modeling	3
ARCH 2	Architectural Practice: Working Drawings	6
CONST 78	Uniform Building Code	2

Fourth Semester

ARCH 3	Architectural Presentations	3
ARCH 5	Architectural Detailing	3
E TECH 41	Civil Drafting: Site Design and Improvement	4

ARCHITECTURAL DRAFTING CERTIFICATE ENGINEERING OPTION

Total Units Required 44

Recommended Sequence:

First Semester

ARCH 1	Basic Architectural Drafting	3
ARCH 8	Materials of Construction	3

Second Semester

ARCH 12	Computer Aided Drafting	3
CONST 89	Methods and Planning	3
MATH 82	Intermediate Algebra	4

Third Semester

ARCH 2	Architectural Practice: Working Drawings	6
CONST 78	The Uniform Building Code	2
E TECH 31	Fundamentals of Civil Drafting	4
E TECH 22	Three Dimensional Modeling	3

Fourth Semester

ARCH 5	Architectural Detailing	3
E TECH 41	Civil Drafting: Site Design and Improvement	4
E TECH 46	Mechanical and Electrical Systems	3
E TECH 76	Applied Statics	3

CARPENTRY TECHNOLOGY CERTIFICATE

Total Units Required 47-49

Recommended Sequence:

First Semester

CONST 72A	Beginning Residential Carpentry	10
ARCH 1	Basic Architectural Drafting	3

Second Semester

CONST 72B	Intermediate Residential Carpentry	10
INDUS 94	Industrial Mathematics	3

OR

MATH 80	Elementary Algebra	4
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Third Semester

CONST 72C	Advanced Residential Carpentry	10
CONST 78	Uniform Building Code	2

Fourth Semester

INDUS 20	Industrial Safety and Health	3
CONST 54	Estimating and Specifications	3
*ELECTIVE	See Group 1 Below	3-4

•Group 1 (Electives)

(minimum of 3 units from the following)

ARCH 12	Computer Aided Drafting	3
BUS 18A	Business Law	3
BUS 60	Small Business Management	3
CONST 71B	Beginning Mill Cabinet	4
CONST 89	Methods and Planning	3

COMPUTER-AIDED DRAFTER CERTIFICATE

Total Units Required 18

Recommended Sequence:

First Semester

ENGR 1	Introduction to Engineering and Technology	3
E TECH 11	Engineering Drafting	3
E TECH 12	Computer-Aided Drafting	3
E TECH 13	Engineering Drafting Skills	3

Second Semester

ENGR 2	Engineering Graphics	3
ENGR 22	Three-Dimensional Modeling	3

CONSTRUCTION MANAGEMENT TECHNOLOGY CERTIFICATE

Total Units Required 36

Recommended Sequence:

First Semester

ARCH 1	Basic Architectural Drafting	3
ARCH 8	Materials of Construction	3
MATH 80	Elementary Algebra	4

Second Semester

ARCH 12	Computer-Aided Drafting	3
CONST 54	Estimating and Specifications	3
BUS 60	Small Business Management	3
OR		
BUS 94A,B,C	Small Business Startup	3

Third Semester

BUS 18A	Business Law	3
BUS/C S 14	Microcomputers and Small Business Systems	3
CONST 78	Uniform Building Code	2

Fourth Semester

INDUS 20	Industrial Safety and Health	3
E TECH 46	Mechanical and Electrical Systems	3
CONST 89	Methods and Planning	3

CONSTRUCTION TECHNOLOGY CERTIFICATE

Evening Program

Total Units Required 39-41

Recommended Sequence:

First Semester

ARCH 1	Basic Architectural Drafting	3
ARCH 8	Materials of Construction	3

Second Semester

ARCH 12	Computer Aided Drafting	3
BUS 18A	Business Law	3

Third Semester

CONST 54	Estimating and Specifications	3
MATH 80	Elementary Algebra	4

Fourth Semester

INDUS 20	Industrial Safety and Health	3
CONST 73	Blueprint Reading	3

Fifth Semester

C S 14	Microcomputers and Small Business Systems	3
CONST 78	Uniform Building Code	2

Sixth Semester

E TECH 46	Mechanical and Electrical Systems	3
CONST 89	Methods and Planning	3

IN ADDITION

(one course from the following)

BUS 60	Small Business Management	3
OR		
BUS 94A	Small Business Startup	1
AND		
BUS 94B	Essential Topics for Small Business	1
AND		
BUS 94C	The New Entrepreneur	1
OR		
ARCH 2	Architectural Practice: Working Drawings	6

MILL CABINET TECHNOLOGY CERTIFICATE

Total Units Required 35 - 40

Recommended Sequence:

First Semester

CONST 10	Wood Technology	5
ARCH 1	Basic Architectural Drafting	3

Second Semester

CONST 71A	Mill Cabinet Fundamentals	4
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OR

CONST 71B	Beginning Mill Cabinet	4
INDUS 20	Industrial Safety and Health	3
*ELECTIVE	See Group 1	3

Third Semester

CONST 71B	Beginning Mill Cabinet	4
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OR

CONST 71C	Intermediate Mill Cabinet	4
CONST 54	Estimating and Specification	3
*ELECTIVE	See Group 1	3

Fourth Semester

CONST 71C	Intermediate Mill Cabinet	4
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OR

CONST 71D	Advanced Mill Cabinet	4
INDUS 94	Industrial Mathematics	3

OR

MATH 80	Elementary Algebra	4
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***Group 1 (Electives)**

(minimum of 6 units from the following)

ARCH 12	Computer-Aided Drafting	3
CONST 72A	Beginning Residential Carpentry	10
CONST 72B	Intermediate Residential Carpentry	10
CONST 78	Uniform Building Code	2
CONST 89	Methods and Planning	3

APPAREL DESIGN CERTIFICATE

Total Units Required 32 - 33

Required Courses

FCS 42	Textiles	3
FCS 43	Origins of Fashion	3
FCS 44	Clothing in Contemporary Society	3
FCS 47A	Clothing Construction	3
FCS 47B	Clothing Construction	3
FCS 48A	Flat Pattern Design	3
FCS 48B	Fashion Apparel	3
FCS 49A	Custom Clothing Techniques	3
•ELECTIVES	See Group 1	8

•Group 1 (Electives)

(minimum of 8 units from the following)

FCS 40	Introduction to Fashion Merchandising	3
FCS 41	Fashion Product Knowledge	3
FCS 49B	Custom Clothing Techniques	3
FCS 51	Fashion Illustration	3
FCS 52	Fashion Field Study	2 - 3

CARE PROVIDER TRAINING CERTIFICATE

Total Units Required 9.5

Required Courses

H S 72A	Care Provider Training: Mental Disabilities	1
H S 72B	Care Provider Training: Psychotropic Medications	1
H S 72C	Care Provider Training: Behavior Management	1
H S 72D	Care Provider Training: Normalization	1
H S 72E	Care Provider Training: Pre-Independent Living Training	1
H S 72F	Care Provider Training: Community Resources and Program Planning	1
H S 72G	Care Provider Training: Recognizing Other Needs of the Residents	1
H S 72H	Care Provider Training: Client Record Keeping	1
H S 72I	Care Provider Training: Nutrition	1
H ED 32	Cardiopulmonary Resuscitation (CPR)	0.5

CULINARY ARTS CERTIFICATE

Total Units Required 38

Recommended Sequence:

First Semester

CUL ART 1	Introduction to the Hospitality Industry	2
CUL ART 3	Sanitation and Safety	2
CUL ART 4	Food and Beverage Cost Technologies	2
CUL ART 5	Commercial Food Preparation	4

Second Semester

CUL ART 7	Baking	3
CUL ART 9	Restaurant Operations	6.5
CUL ART 11	Menu Planning	1.5
CUL ART 13	Purchasing and Receiving	1.5
FCS 6	Nutrition	3

Third Semester

CUL ART 19	Advanced Quantity Food Preparation	6.5
CUL ART 25	Foodservice Management	2
CUL ART 27	Garde Manger	1.5
CUL ART 29	Beverage Management	1.5
FCS 93V	Work Experience	1

BASIC CULINARY ARTS CERTIFICATE

Total Units Required 8

Recommended Sequence:

First Semester

CUL ART 1	Introduction to the Hospitality Industry	2
CUL ART 3	Sanitation and Safety	2
CUL ART 5	Commercial Food Preparation	4

DIETARY SERVICE SUPERVISOR CERTIFICATE

Total Units Required 16

Recommended Sequence:

First Semester

CUL ART 3	Sanitation and Safety	2
CUL ART 5	Commercial Food Preparation	4
FCS 6	Nutrition	3

Second Semester

FCS 91	Medical Nutrition Therapy	3
CUL ART 25	Foodservice Management	2
FCS 50H	Special Studies: Family & Consumer Science	2

EARLY CHILDHOOD EDUCATION ASSISTANT CERTIFICATE

Total Units Required 6

Required Courses

FCS 26	Child, Family, and Community	3
FCS 28	Health and Safety in Child Care	2
FCS 63	Child Discipline	1

EARLY CHILDHOOD EDUCATION ASSOCIATE TEACHER CERTIFICATE

Total Units Required 12

Recommended Sequence:

First Semester

FCS 21	Child Development	3
FCS 26	Child, Family, and Community	3

Second Semester

FCS 31A	ECE Theory: Working with Children	3
FCS 32A	ECE Practicum	3

EARLY CHILDHOOD EDUCATION MASTER TEACHER CERTIFICATE

Total Units Required 48

Recommended Sequence:

First Semester

FCS 21	Child Development	3
FCS 26	Child, Family, and Community	3
*GEN EDUC	Written Communications: See Group I	3-5
*GEN EDUC	Social Science: See Group I	3

Second Semester

FCS 29	Early Childhood Experiences: Arts and Sciences	3
FCS 31A	ECE Theory: Working with Children	3
FCS 32A	ECE Practicum	3
*GEN EDUC	Humanities: See Group I	3-5

Third Semester

FCS 30	Early Childhood Experiences: Language Arts	3
FCS 31B	ECE Theory: Early Cognitive Learning	3
FCS 32B	ECE Practicum	3
*GEN EDUC	Mathematics or Science: See Group I	3-5
**SPECIALIZATION	See Group 2	3

Fourth Semester

FCS 76	ECE Adult Supervision	2
*GEN EDUC	Electives See Group I	3-7
**SPECIALIZATION	See Group 2	3

***Group 1 (General Education Requirements)**

(minimum of one course from the following Associate degree
General Education areas and a minimum of 16 units)

- Learning Skills: Group A
- Learning Skills: Group B
- Humanities
- Social Sciences

****Group 2 (Specialization)**

(minimum of six units selected from any one
of the following specializations)

Special Needs

FCS 34	Children with Special Needs	3
FCS 75B	Procedures for Working with Autistic Children	3
FCS 99A	Meeting The Needs of Children at Risk	1
FCS 99B	Sexual Development and Signs of Sexual Abuse	0.5
FCS 99I	The Impact of Chemical Dependency on Children and Families	0.5
SP ED 7	Introduction to Communication Disorders	3
SP ED 15	Selected Topics: Special Education	1-2
SP ED 22	Beginning American Sign Language	3

Language and Literature for Children

FCS 71	Children, Imagination, and Books	1
HUM 4	Introduction to Linguistics	3
ENG 39	Folklore	3

Creative Arts

FCS 73	Preschool Art	1
DRAMA 45B	Introductory Children's Theater	3
ART 4	Exploring Art	3

School Age Child Care

FCS 36	Activities and Environment for School Age Child Care	3
PE 46	Recreational Leadership	3

Infant Development

FCS 33	Infant Development and Caregiving	3
FCS 39	Infant/Toddler Practicum	3

Parent-Child Relationships

FCS 61A	Parent Child Learning	2
FCS 61B	Parent Child Communication	2
FCS 62	Positive Parenting	1
FCS 99C	Supporting Relationships between Children and their Families	.5
FCS 99E	Nurturing Lifetime Relationships	.5
FCS 99H	The Impact of Placement on Foster Families	.5
FCS 99I	The Impact of Chemical Dependency on Families	.5
PSYCH 48	Family Counseling in Human Service Agencies	3

EARLY CHILDHOOD EDUCATION SITE SUPERVISOR CERTIFICATE

Total Units Required 60

Recommended Sequence:

First Semester

FCS 21	Child Development	3
FCS 26	Child, Family, and Community	3
*GEN EDUC	Written Communications: See Group I	3-5
*GEN EDUC	Social Science: See Group I	3
*GEN EDUC	Elective: See Group I	3-5

Second Semester

FCS 29	Early Childhood Experiences: Arts and Sciences	3
FCS 31A	ECE Theory: Working with Children	3
FCS 32A	ECE Practicum	3
FCS 37	Administration of Child Care Programs	3
*GEN EDUC	Humanities: See Group I	3-5

Third Semester

FCS 30	Early Childhood Experiences: Language Arts	3
FCS 31B	ECE Theory: Early Cognitive Learning	3
FCS 32B	ECE Practicum	3
FCS 38	Development and Financial Management of Child Care Programs	3
*GEN EDUC	Mathematics or Science: See Group I	3-5

Fourth Semester

FCS 76	ECE Adult Supervision	2
*GEN EDUC	Elective: See Group I	3-13

***Group 1 (General Education Requirements)**

(minimum of one course from the following Associate degree

General Education areas and a minimum of 28 units)

- Learning Skills: Group A
- Learning Skills: Group B
- Humanities
- Natural Sciences
- Social Sciences

EARLY CHILDHOOD EDUCATION TEACHER CERTIFICATE

Total Units Required 40

Recommended Sequence:

First Semester

FCS 21	Child Development	3
FCS 26	Child, Family, and Community	3
*GEN EDUC	Written Communications: See Group 1	3-5
*GEN EDUC	Social Sciences: See Group 1	3-5

Second Semester

FCS 29	Early Childhood Experiences: Arts and Sciences	3
FCS 31A	ECE Theory: Working with Children	3
FCS 32A	ECE Practicum	3
*GEN EDUC	Humanities: See Group 1	3-5

Third Semester

FCS 30	Early Childhood Experiences: Language Arts	3
FCS 31B	ECE Theory: Cognitive Development	3
FCS 32B	ECE Practicum	3
*GEN EDUC	Mathematics or Science: See Group 1	3-5
*GEN EDUC	Electives: See Group 1	0-4

***Group 1 (General Education Requirement)**

(minimum of one course from the following Associate degree

General Education areas and a minimum of 16 units)

- Learning Skills: Group A
- Learning Skills: Group B
- Humanities
- Social Sciences

FAMILY AND CONSUMER SCIENCES CERTIFICATE

Life Management

Required Courses	Total Units Required	36
FCS 2 Life Management	3	
FCS 5 Nutrition	3	
OR		
FCS 6 Basic Nutrition	3	
FCS 8 Food Preparation	3	
FCS 10 Interior Design	3	
FCS 3 Home Management and Finance	3	
FCS 21 Child Development	3	
FCS 23 Marriage and the Family	3	
FCS 42 Textiles	3	
FCS 47A Clothing Construction	3	
•ELECTIVES See Group 1	9	

•Group 1 (Electives)

(minimum of 9 units from any courses in
the following departments)

Family and Consumer Sciences 1-99
Culinary Arts 1-99

FAMILY DAY CARE PROVIDER CERTIFICATE

Required Courses	Total Units Required	7
FCS 21 Child Development	3	
FCS 63 Child Discipline	1	
•FCS 70 Introduction to Family Day Care	1	
••H ED 30 Standard First Aid	2	
•Individuals who are already licensed Family Day Care Providers may substitute one unit from the following:		
FCS 71 Children, Imagination, and Books	1	
FCS 72 Play and Learning	1	
FCS 73 Preschool Art	1	
FCS 74 Preschool Science	1	

••A current Red Cross CPR and First Aid certificate may be substituted for H ED 30.

FASHION MERCHANDISING CERTIFICATE

Required Courses	Total Units Required	33
FCS 40 Introduction to Fashion Merchandising	3	
FCS 41 Fashion Product Knowledge	3	
FCS 42 Textiles	3	
FCS 43 Origins of Fashion	3	
FCS 44 Clothing in Contemporary Society	3	
FCS 45 Fashion Sales and Promotion	3	
FCS 46 Visual Merchandising	3	
FCS 47A Clothing Construction	3	
FCS 52 Fashion Field Study	3	
•ELECTIVES See Group 1	6	

•Group 1 (Electives)

(minimum of 6 units from the following)

BUS 21 Marketing	3
BUS 22 Professional Selling	3
BUS 23 Advertising	3
BUS 82 Business Mathematics 1, 2, or 3	2
OR	
MATH (any course)	3 - 4
SPCH 1A Fundamentals of Speech	3

INTERIOR DESIGN CERTIFICATE

Required Courses	Total Units Required	30
FCS 10 Interior Design	3	
FCS 11 Applied Interior Design	3	
FCS 12 History of Furniture	3	
FCS 13 Specifications and Professional Practices	3	
FCS 42 Textiles	3	
ARCH 1 Basic Architectural Drafting	3	
ART 1A Art History	3	
OR		
ART 1B Art History	3	
ART 16 Descriptive Drawing and Rendering	3	
•ELECTIVES See Group 1	6	

•Group 1 (Electives)

(minimum of 6 units from the following)

FCS 14 Lighting Design	3
FCS 50H Special Studies: Family and Consumer Science	1 - 2
ARCH 2 Architectural Practice: Working Drawings	5
BUS 1A Principles of Accounting	5
CONST 78 Uniform Building Code	2

ENGINEERING/ENGINEERING TECHNOLOGY COURSE TRANSITION MATRIX

PRIOR TO FALL 1997		FALL 1997 THRU SUMMER 1999		FALL 1999/SPRING 2000	
Course No.	Course Title	Course No.	Course Title	Course No.	Course Title
ENGR 10	Engineering Orientation	ENGR 1	Intro. to Engineering & Tech.	ENGR 1	Intro. to Engineering & Tech.
ENGR 11	Engineering Tech. Career Prep.	Course included in ENGR 1		Course included in ENGR 1	
ENGR 22	Engineering Graphics	ENGR 2	Engineering Graphics	ENGR 2	Engineering Graphics
ENGR 51	Descriptive Geometry	Course replaced by ENGR 2		Course replaced by ENGR 2	
ENGR 45	Engineering Materials	ENGR 4	Engineering Materials	ENGR 4	Engineering Materials
ENGR 38	Intro. to Circuit Analysis	ENGR 6	Engineering Circuit Analysis	ENGR 6	Engineering Circuit Analysis
ENGR 38L	Intro. to Circuit Analysis Lab	Course included in ENGR 6		Course included in ENGR 6	
ENGR 35	Statics	ENGR 8	Statics	ENGR 8	Statics
ENGR 1A	Plane Surveying	ENGR 10	Surveying	ENGR 10	Surveying
ENGR 1B	Plane Surveying	ENGR 20	Surveying	Course included in ENGR 10	
ENGR 27	Engineering FORTRAN	ENGR 27	Engineering FORTRAN	ENGR 27	Engineering FORTRAN
ENGR 58B	AutoCAD Customization	ENGR 58B	AutoCAD Customization	ETECH 23	AutoCAD™ Customization
ENGR 58C	Computer Aided Drafting Projects	ENGR 58C	Computer Aided Drafting Projects	ETECH 25	Computer Aided Drafting Projects
ENGR 58D	AutoCAD Three Dim. Modeling	ENGR 58D	AutoCAD Three Dim. Modeling	ETECH 22	Three Dimensional Modeling
ENGR 58E	AutoLISP Programming	ENGR 58E	AutoLISP Programming	ETECH 24	AutoLISP™ Programming
ENGR 3	Engineering Drafting Skills	ETECH 3	Engineering Drafting Skills	ETECH 13	Engineering Drafting Skills
ENGR 5	Engineering Drafting	ETECH 11	Engineering Drafting	ETECH 11	Engineering Drafting
ENGR 58A	Computer Aided Drafting	ETECH 12	Computer Aided Drafting	ETECH 12	Computer Aided Drafting
ENGR 60	Materials and Measurements	ETECH 20	Materials and Measurements	ETECH 20	Materials and Measurements
ENGR 54A	Fundamental of Civil Drafting	ETECH 31	Fundamentals of Civil Drafting	ETECH 31	Fundamentals of Civil Drafting
ENGR 65	Technical Statics	ETECH 32	Technical Statics	ETECH 26	Technical Statics
ENGR 52	Machine Drafting	ETECH 34	Machine Drafting	ETECH 34	Machine Drafting
ENGR 64	Machine Design	ETECH 35	Machine Design	ETECH 35	Machine Design
ENGR 56 or 46	Electronic Drafting	ETECH 37	Electronic Drafting	Course Deleted - See Catalog Rights Substitute Matrix	
ENGR 54B	Civil Drafting: Site Des. & Imp.	ETECH 41	Civil Drafting: Site Des. & Imp.	ETECH 41	Civil Drafting: Site Des. & Imp.
ENGR 66	Technical Strength of Materials	ETECH 42	Technical Strength of Materials	Course Deleted - No Substitute	
ENGR 53	Principles of Fluid Mechanics	ETECH 43	Principles of Fluid Mechanics	Course Deleted - No Substitute	
ENGR 63	Practical Machine Design	ETECH 45	Practical Machine Design	ETECH 45	Practical Machine Design
ENGR 57	Mechanical and Electrical System	ETECH 46	Mechanical and Electrical System	ETECH 46	Mechanical and Electrical System
		ETECH 47	Intro. to Industrial Control System	ETECH 47	Intro. to Industrial Control System
ENGR 61A	Technical Surveying	ETECH 70	Applied Surveying	ETECH 80	Applied Surveying (includes ET70)
		ETECH 72	Applied Statics	ETECH 76	Applied Statics
ENGR 73	Trade Technician Drafting Skills	ETECH 73	Trade Technician Drafting Skills	ETECH 73	Trade Technician Drafting Skills
ENGR 61B	Technical Surveying	ETECH 80	Applied Surveying	Replaces ET 70 - See Catalog Rights Substitute Matrix	
		ETECH 82	Applied Strength of Materials	Course Deleted - See Catalog Rights Substitute Matrix	
		ETECH 83	Applied Fluid Mechanics	Course Deleted - See Catalog Rights Substitute Matrix	

ENGINEERING CERTIFICATE

Total Units Required 51

Recommended Sequence:

First Semester

ENGR 1	Introduction to Engineering and Technology	3
MATH 1	Calculus	5
ENG 1A	Written Communication	3

Second Semester

ENGR 2	Engineering Graphics	4
MATH 2	Calculus	4
CHEM 1A	General Chemistry	5
PHYS 4A	Principles of Physics: Mechanics	4

Third Semester

ENGR 4	Engineering Materials	3
ENGR 29	Engineering Applications for Digital Computations	3
MATH 3	Vector Calculus	4

Fourth Semester

ENGR 8	Statics	3
ENGR 6	Engineering Circuit Analysis	4
MATH 4	Differential Equations	3
PHYS 4C	Principles of Physics: Electricity and Magnetism	4

ENGINEERING DRAFTER/TECHNICIAN CERTIFICATE

Total Units Required 45.5 - 48.5

Recommended Sequence:

First Semester

ENGR 1	Introduction to Engineering and Technology	3
E TECH 11	Engineering Drafting	3
E TECH 12	Computer Aided Drafting	3
E TECH 13	Engineering Drafting Skills	3

Second Semester

ENGR 2	Engineering Graphics	3
E TECH 20	Materials and Measurements	3
E TECH 22	Three Dimensional Modeling	3
E TECH 26	Technical Statics	3

OR

E TECH 76	Applied Statics	3
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Third Semester

E TECH 31	Fundamentals of Civil Drafting	3
E TECH 34	Machine Drafting	3
E TECH 35	Machine Design	3
E TECH 80	Applied Surveying	3
MECH 15	Machine Tool Process (mechanical students only)	0-3

Fourth Semester

E TECH 46	Mechanical and Electrical Systems	3
<i>AND completion of all the courses in ONE of the specialization elective options shown below:</i>		

CIVIL

E TECH 41	Civil Drafting: Site Design	3
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OR

ELECTRO-MECHANICAL

E TECH 47	Control Systems	2
ELECt 11	AC and DC Network Analysis	4.5

OR

MECHANICAL

E TECH 45	Practical Machine Design	3
E TECH 47	Control Systems	2

FLUID POWER ENGINEERING TECHNOLOGY CERTIFICATE

Total Units Required 62.5

Recommended Sequence:

First Semester

INDUS 31	Hydraulics and Pneumatics	4
PHYS 10	Introduction to Physics	4
MATH 82	Intermediate Algebra	4
ENG 72	Technical Writing	3

Second Semester

INDUS 35	Mobile Hydraulics	4
INDUS 37	Industrial Pneumatics	4
ELECT 11	AC and DC Network Analysis	5
ENG 1A	Written Communications	3

Third Semester

MECH 15	Machine Tool Process	4
ENGR 73	Trade Technician Drafting Skills	3
ELECT 13A	Integrated Circuits	4.5
MATH 36	Precalculus	5
OR		
MATH 87	Technical Mathematics	5

Fourth Semester

INDUS 87	Fluid Power Specialization	2
INDUS 41	Instrumentation and Process Control	3
ELECT 16	Introduction to Microprocessor	4
E TECH 12	Computer Aided Drafting	3
SPCH 1A	Fundamentals of Speech	3

CORRECTIONAL SCIENCE CERTIFICATE

Total Units Required 24

Recommended Sequence:

First Semester

AJ 22	Concepts of Criminal Law	3
AJ 51	Introduction to Correctional Science	3
AJ 53	Correctional Interviewing and Interventions	3
•ELECTIVE	See Group 1	3

Second Semester

AJ 31	Report Preparation	3
AJ 55	Control and Supervision in Corrections	3
AJ 57	Legal Aspects of Corrections	3
•ELECTIVE	See Group 1	3

•Group 1 (Electives)

(two courses from the following)

AJ 28	Juvenile Law and Procedures	3
AJ 41	Narcotics Investigation and Control	3
AJ 54	Introduction to Probation and Parole	3

FIRE CERTIFICATE

Total Units Required 43.3

First Semester

FIRE 70	Fire Protection Organization	3
FIRE 71	Fire Protection Technology	3
•GEN EDU	Natural Sciences: See Group 1	3
BUS 82B	Business Mathematics AND	2
BUS 82C	Business Mathematics	2

Second Semester

FIRE 74	Fire Behavior & Combustion	3
H S 77B	Emergency Medical Technician I	5
PSYCH 1	Introduction to Psychology OR	3
PSYCH 20	Stress Management	1

Third Semester

FIRE 72	Fire Protection Equipment & Systems	3
FIRE 73	Building Construction for Fire Protection	3
MATH 80	Elementary Algebra	4
••ELECTIVES	See Group 2	3

Fourth Semester

FIRE 91	Basic Fire Academy	9.3
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•Group 1 (Electives)

(one course from the Group 1, Natural Sciences)

••Group 2 (Electives)

(minimum of 3 units from the following)

FIRE 28	Fire Hydraulics	3
FIRE 76	Heavy Fire Equipment Operation	6
FIRE 92	Fire Investigation	3
FIRE 94	Incident Command	3
FIRE 95A	Command and Fire Strategy and Tactics	3
FIRE 95B	Incident Command	3

LAW ENFORCEMENT CERTIFICATE

Total Units Required 46 - 47

Required Courses

A J 21	Criminal Justice in Society	3
A J 22	Concepts of Criminal Law	3
A J 23	Principles and Procedures of the Justice System	3
A J 24	Legal Aspects of Evidence	3
A J 25	Criminal Investigation	3
A J 31	Report Preparation	3
A J 40	Community Relations	3
ENG 1A	Written Communications	3
SPCH 1A	Fundamentals of Speech	3
MATH 80	Elementary Algebra	4
C S 11	Computer Science Fundamentals	3
SOCIO 1A	Introduction to Sociology	3
POLSC 1	American Government and Institutions	3
OR		
HIST 17A	History of the U. S.	3
OR		
HIST 17B	History of the U. S.	3
•NAT SCI	See Group 1	3-4
••HUM	See Group 2	3-5

•Group 1 (Natural Science)

(one course from Group I, Natural Science, General Education requirement for the Associate degree) 3

••Group 2 (Humanities)

(one course from Group III, Humanities, General Education requirement for the Associate degree) 3

NOTE: The following courses are suggested electives, but they are not required.

A J 26	Patrol Procedures	3
A J 28	Juvenile Law and Procedures	3
A J 41	Narcotics Investigation and Control	3
Foreign Language		5-10

EDUCATION AIDE CERTIFICATE

Total Units Required 25 - 27

Required Courses

EDUC 10	Introduction to Education	4
SOCIO 1A	Introduction to Sociology	3
OR		
PSYCH 1	Introduction to Psychology	3
SOCIO 33	Social Inequality in the United States	3
SPCH 1A	Fundamentals of Speech	3
ENG 1A	Written Communications	3
FCS 21	Child Development	3
PSYCH 45A	Beginning Field Practicum	2
OR		
SOCIO 45A	Beginning Field Practicum	2
C S 20	Microsoft Word, Excel, and Access	3
•ELECTIVES	See Group 1	3

•Group 1 (Electives)

(three units from the following)

ART 4	Exploring Art	3
DRAMA 6A	Beginning Improvisational Theatre	2
MUSIC 36A	Class Piano	1

ELIGIBILITY WORKER CERTIFICATE

Total Units Required 26 - 30

Recommended Sequence:

Fall Semester

SOCIO 1A	Introduction to Sociology	3
SOCIO 24	Social Welfare	3
SOCIO 45A	Sociology Field Practicum	2
BUS 14/C S 14	Microcomputers and Small Business Systems	3

OR

C S 11	Computer Science Fundamentals	3
ENG 1A	Written Communications	3

OR

ENG 79	Preparatory English	5
•ELECTIVE	See Group 1	2-3

Spring Semester

SOCIO 1B	Problems of a Changing Society	3
SOCIO 33	Social Inequality in the U. S.	3
SOCIO 45B	Sociology Field Practicum	2
•ELECTIVE	See Group 1	2-3

•Group 1 (Electives)

(Minimum of one course from each category)

Category A:

SOCIO 27	Gender in Contemporary Society	3
SOCIO 30	American Immigrant Experience	3

Category B:

PSYCH 52	Introduction to Substance & Abuse Counseling	3
PSYCH 53	Drugs and Society	2
PSYCH 55	Introduction to Child Abuse Counseling	2
PSYCH 56	Assisting Sexual Assault Victims	2

AND

Must have achieved Level II on the mathematical portion of the assessment test, or have completed a Level II mathematical course.

HUMAN SERVICES WORKER CERTIFICATE

Total Units Required 26 - 28

Recommended Sequence:

First Semester

PSYCH 1	Introduction to Psychology	3
PSYCH 38	Counseling Skills for Human Service Workers	3
PSYCH 39	Client Interview, Evaluation, and Referral	2
PSYCH 45A	Beginning Field Practicum	2
PSYCH 46	Individual Counseling in Human Service Programs	3

Second Semester

PSYCH 40	Case Management and Treatment Planning	3
PSYCH 45B	Intermediate Field Practicum	2
PSYCH 47	Group Counseling in Human Service Programs	3
PSYCH 48	Family Counseling in Human Service Programs	2

Additional Requirement

ENG 1A	Written Communications	3
OR		
ENG 79	Preparatory English	5

HUMAN SERVICES WORKER CERTIFICATE Family Abuse Specialist

Total Units Required 30 - 32

Recommended Sequence:

First Semester

PSYCH 1	Introduction to Psychology	3
PSYCH 38	Counseling Skills for Human Service Workers	3
PSYCH 39	Client Interview, Evaluation, and Referral	2
PSYCH 45A	Beginning Field Practicum	2
PSYCH 46	Individual Counseling in Human Service Programs	3

Second Semester

PSYCH 40	Case Management and Treatment Planning	3
PSYCH 45B	Intermediate Field Practicum	2
PSYCH 47	Group Counseling in Human Service Programs	3
PSYCH 48	Family Counseling in Human Service Programs	2

Third Semester

PSYCH 55	Introduction to Child Abuse Counseling	2
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Fourth Semester

PSYCH 56	Assisting Sexual Assault Victims	2
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Additional Requirement

ENG 1A	Written Communications	3
OR		
ENG 79	Preparatory English	5

HUMAN SERVICES WORKER CERTIFICATE Gerontology Specialist

Total Units Required 30 - 32

Recommended Sequence:

First Semester

PSYCH 1	Introduction to Psychology	3
PSYCH 38	Counseling Skills for Human Service Workers	3
PSYCH 39	Client Interview, Evaluation, and Referral	2
PSYCH 45A	Beginning Field Practicum	2
PSYCH 46	Individual Counseling in Human Service Programs	3

Second Semester

PSYCH 40	Case Management and Treatment Planning	3
PSYCH 45B	Intermediate Field Practicum	2
PSYCH 47	Group Counseling in Human Service Programs	3
PSYCH 48	Family Counseling in Human Service Programs	2

Third Semester

PSYCH 24	Psychology of Aging	3
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Fourth Semester

PSYCH 57	Introduction to Gerontology Counseling	3
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Additional Requirement

ENG 1A	Written Communications	3
OR		
ENG 79	Preparatory English	5

HUMAN SERVICES WORKER CERTIFICATE Substance Abuse Specialist

Total Units Required 32 - 34

Recommended Sequence:

First Semester

PSYCH 1	Introduction to Psychology	3
PSYCH 38	Counseling Skills for Human Service Workers	3
PSYCH 39	Client Interview, Evaluation, and Referral	2
PSYCH 45A	Beginning Field Practicum	2
PSYCH 46	Individual Counseling in Human Service Programs	3

Second Semester

PSYCH 40	Case Management and Treatment Planning	3
PSYCH 45B	Intermediate Field Practicum	2
PSYCH 47	Group Counseling in Human Service Programs	3
PSYCH 48	Family Counseling in Human Service Programs	2

Third Semester

PSYCH 52	Introduction to Substance Abuse Counseling	3
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Fourth Semester

PSYCH 53	Drugs and Society	3
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Additional Requirement

ENG 1A	Written Communications	3
OR		
ENG 79	Preparatory English	5

RECREATION ASSISTANT CERTIFICATE

Total Units Required 27

Recommended Sequence:

First Semester

GUID 10	Introduction to College	0.5
H ED 28	Community Health	2
P E 46	Recreational Leadership	3
ELECTIVE	Physical Education Activity Course	2

Second Semester

H ED 30	Community First-Aid and Safety	2
P E 43	Rules and Officiating	2
ELECTIVE	Physical Education Activity Course	2

Third Semester

P E 1A	Beginning Swimming	1.5
P E 49	Psychology of Sports	3
ELECTIVE	Physical Education Activity Course	2

Fourth Semester

H ED 1	Health Education	3
P E 2	Lifeguard Training	2
ELECTIVE	Physical Education Activity Course	2

ELECTRICAL TECHNOLOGY CERTIFICATE

Total Units Required 42 - 44

Required Courses

ELEC 30	Fundamentals of Electricity	5
ELEC 31	Electrical Wiring Methods	7
ELEC 32	Electrical Motor and Controls	7
ELEC 33	Industrial Wiring Methods	5
ELEC 34	Advanced Motors and Controls	7
INDUS 45	Industrial Technology	5
OR		
PHYS 10	Introduction to Physics	4
MATH 80	Elementary Algebra	4
INDUS 31	Hydraulics and Pneumatics	4
OR		
MECH 15	Machine Tool Process	3

ELECTRONICS TECHNOLOGY CERTIFICATE

Total Units Required 31.5 - 33.5

Required Courses

ELECT 11	AC and DC Network Analysis	4.5
ELECT 12	Solid State Devices	6.5
ELECT 13A	Integrated Circuits	4.5
ELECT 14A	Electronics Troubleshooting	3
ELECT 14B	Advanced Electronics Troubleshooting	3
ELECT 14C	Troubleshooting Computers	3
ELECT 16	Introduction to Microprocessors	4
ELECT 79	Electronics Mathematics	3
OR		
MATH 80	Elementary Algebra	4

HEATING AND AIR CONDITIONING CERTIFICATE

Total Units Required 48

Recommended Sequence:

First Semester

MECH 30A	Refrigeration and Air Conditioning	4
MECH 32A	Air Conditioning Control Circuit Analysis	3
MECH 60	Metal Trade Layout and Forming	5

Second Semester

MECH 31A	Basic Air Conditioning: Components and Circuits	6
MECH 30B	Intermediate Refrigeration	4
ELEC 30	Fundamentals of Electricity	5

Third Semester

MECH 31B	Basic Air Conditioning: Troubleshooting	6
MECH 32B	Refrigeration Control Circuit Analysis	3
INDUS 76	Tools and Measurement	3

Fourth Semester

MECH 31C	Heat Pumps and Air Conditioning Systems	6
INDUS 94	Industrial Mathematics	3

INDUSTRIAL TECHNOLOGY CERTIFICATE

Total Units Required 36 - 42

Required Courses

MECH 15	Machine Tool Process	4
MECH 10	Basic Welding for the Trades	4
INDUS 31	Hydraulics and Pneumatics	4
MECH 30A	Refrigeration and Air Conditioning	4
E TECH 73	Trade Technician Drafting Skills	3
ELEC 30	Fundamentals of Electricity	5
OR		
ELECT 11	AC and DC Network Analysis	5
MATH 80	Elementary Algebra	4
OR		
INDUS 94	Industrial Mathematics	3
•ELECTIVES	See Group 1	6 - 11

•Group 1 (Electives)

(two courses from the following)

ELEC 35	Commercial Electrical Wiring	4
INDUS 20	Industrial Safety and Health	3
MECH 31A	Basic Air Conditioning: Components and Circuits	6
MECH 32A	Air Conditioning Control Circuit Analysis	3
MECH 60	Metal Trade Layout and Forming	5

The following 4 patterns are options for Apprentices to earn the Industrial Technology Certificate:

- Electrical Apprenticeship
- Maintenance Apprenticeship
- Mechanical Apprenticeship
- Operations Apprenticeship

**INDUSTRIAL
TECHNOLOGY
CERTIFICATE
ELECTRICAL APPRENTICESHIP
OPTION**

Total Units Required 34

Recommended Sequence:

First Semester

A-IND 72A	Introduction to Apprenticeship	2
A-IND 76	Applied Technical Mathematics	2
A-ELE 75A	Basic Electricity	2
A-ELE 75B	Advanced Electricity	2
A-IND 77A	Mechanical Fundamentals	2

Second Semester

A-IND 77B	Bearings, Pumps, and Turbines	2
A-IND 77C	Motors and Generators	2
A-IND 77D	Plant Auxiliary Equipment	2

Third Semester

A-ELEC 75C	Transformers and Polychlorinated Biphenyl	2
A-ELEC 75D	Protective Relaying	2

Fourth Semester

A-IND 77G	Governor Systems	2
A-IND 77H	Computers in Hydro-Electric Plants	2
A-IND 77N	Electro-Mechanical Print Reading	3

Fifth Semester

A-IND 77K	Fundamentals of Thermodynamics	2
A-IND 77L	Project Control and Power Contracts	2

Sixth Semester

A-ELEC 75E	High Voltage Switching	2
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Seventh Semester

A-IND 77M	Air Conditioning	2
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**INDUSTRIAL
TECHNOLOGY
CERTIFICATE
MAINTENANCE APPRENTICESHIP
OPTION**

Total Units Required 44

Recommended Sequence:

First Semester

A-IND 72A	Introduction to Apprenticeship	2
A-IND 76	Applied Technical Mathematics	2
A-IND 78A	Defensive Driving	2
A-IND 78B	Heavy Truck Operation	2
A-IND 78C	Diesel and Small Gasoline Engines	2
A-IND 78D	Surveying and Flood Control Systems	2

Second Semester

A-IND 78E	Soils, Asphalt, and Concrete	2
A-IND 78F	Environmental Awareness	1
A-IND 78G	Power Lift and Four-Wheel Drive Units	2
A-IND 78P	Powder-Actuated Equipment	1

Third Semester

A-ELEC 75A	Basic Electricity	2
A-ELEC 75B	Advanced Electricity	2
A-IND 78H	Protective Coatings	2
A-MEC 74A	Basic Welding	2

Fourth Semester

A-IND 77H	Computers in Hydro-Electric Plants	2
A-IND 77J	Water Aqueduct Systems	2

Fifth Semester

A-IND 77L	Project Control and Power Contracts	2
A-IND 78K	Mobile Cranes and Rigging	2
A-IND 78L	Motor Grader Operation	2
A-IND 78M	Tractor Operations, Trenching, and Shoring	2

Sixth Semester

A-IND 77E	Hydraulics	2
A-IND 78N	Pesticides and Herbicides	2
A-MEC 74B	Machine Shop	2

**INDUSTRIAL
TECHNOLOGY
CERTIFICATE
MECHANICAL APPRENTICESHIP
OPTION**

Total Units Required 34

Recommended Sequence:

First Semester

A-IND 72A	Introduction to Apprenticeship	2
A-IND 76	Applied Technical Mathematics	2
A-ELE 75A	Basic Electricity	2
A-IND 77A	Mechanical Fundamentals	2

Second Semester

A-IND 77B	Bearings, Pumps, and Turbines	2
A-IND 77D	Plant Auxiliary Equipment	2

Third Semester

A-ELEC 75C	Transformers and Polychlorinated Biphenyl	2
A-IND 77E	Hydraulics	2
A-IND 77F	Pneumatics	2

Fourth Semester

A-IND 77G	Governor Systems	2
A-IND 77H	Computers in Hydro-Electric Plants	2
A-IND 77N	Electro-Mechanical Print Reading	3

Fifth Semester

A-IND 77K	Fundamentals of Thermodynamics	2
A-IND 77L	Project Control and Power Contracts	2
A-MEC 74A	Basic Welding	2

Sixth Semester

A-MEC 74B	Machine Shop	2
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Seventh Semester

A-IND 77M	Air Conditioning	2
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**INDUSTRIAL
TECHNOLOGY
CERTIFICATE
OPERATIONS APPRENTICESHIP
OPTION**

Total Units Required 34

Recommended Sequence:

First Semester

A-IND 72A	Introduction to Apprenticeship	2
A-IND 76	Applied Technical Mathematics	2
A-ELE 75A	Basic Electricity	2
A-ELE 75B	Advanced Electricity	2
A-IND 77A	Mechanical Fundamentals	2

Second Semester

A-IND 77B	Bearings, Pumps, and Turbines	2
A-IND 77C	Motors and Generators	2
A-IND 77D	Plant Auxiliary Equipment	2

Third Semester

A-ELEC 75C	Transformers and Polychlorinated Biphenyl	2
A-ELEC 75D	Protective Relaying	2
A-ELEC 75E	High Voltage Switching	2

Fourth Semester

A-IND 77G	Governor Systems	2
A-IND 77H	Computers in Hydro-Electric Plants	2
A-IND 77N	Electro-Mechanical Print Reading	3

Fifth Semester

A-IND 77J	Water Aqueduct Systems	2
A-IND 77K	Fundamentals of Thermodynamics	2
A-IND 77L	Project Control and Power Contracts	2

MACHINE SHOP TECHNOLOGY CERTIFICATE

Total Units Required 48

Recommended Sequence:

First Semester

MECH 50A Introductory Machine Shop 8

OR

MECH 67A Elementary Machine Shop 4

AND

MECH 67B Elementary Machine Shop 4

E-TECH 3 Engineering Drawing Skills 3

INDUS 45 Industrial Technology 5

OR

ELEC 30 Fundamentals of Electricity 5

Second Semester

MECH 50B Beginning Machine Shop 8

OR

MECH 67C Machine Shop 4

AND

MECH 67D Machine Shop 4

E TECH 12 Computer-Aided Drafting 3

MECH 60 Metal Trade Layout and Forming 5

Third Semester

MECH 50C Intermediate Machine Shop 8

MECH 10 Metallurgical Technology and Welding 4

INDUS 31 Hydraulics and Pneumatics 4

OR

INDUS 35 Mobile Hydraulics 4

PRINTING TECHNOLOGY CERTIFICATE

Total Units Required 30.5 - 32.5

Required Courses

•BIM 1A Beginning Keyboarding 1.5

PRINT 51A Introduction to Graphic Communication 5

PRINT 60 Introduction to Graphic Production 5

ENG 1A Written Communications 3

OR

ENG 79 Preparatory English 5

••PRINT

ELECTIVES See Group 1 10

••ELECTIVES See Group 2 6

•or a typing certificate for 25 words per minute or better

••Group 1 (Print Electives)

(minimum of 10 units from the following)

PRINT 51B Beginning Graphic Communications 5

PRINT 61 Creative Services 5

PRINT 62 Pre-Press 5

PRINT 63 Press and Finishing 5

PRINT 82A Metropolitan Newspaper Production 5

PRINT 82B Advanced Metropolitan Newspaper Production 5

PRINT 83A Applied Graphic Arts 5

PRINT 83B Applied Graphic Arts 5

PRINT 84A Offset Presswork 5

PRINT 84B Offset Presswork 5

PRINT 87A Printing Specialization 5

PRINT 87B Printing Specialization 5

•••Group 2 (Electives)

(minimum of 6 units from the following)

ART 4 Exploring Art 3

ART 6 Color and Design 3

BUS 23 Advertising 3

INDUS 76 Tools and Measurements 3

PHOTO 1A Introduction to Photography 3

C S 18B Microcomputers and Small Business:

Apple Macintosh 3

BIM 23A Beginning Desktop Publishing

Using PageMaker 3

REFRIGERATION CERTIFICATE

Total Units Required 36

Recommended Sequence:

First Semester

MECH 30A	Refrigeration and Air Conditioning	4
MECH 32A	Air Conditioning Control Circuit Analysis	3
MECH 60	Metal Trade Layout and Forming	5

Second Semester

MECH 31A	Basic Air Conditioning	6
MECH 30B	Intermediate Refrigeration	4
ELEC 30	Fundamentals of Electricity	5

Third Semester

MECH 31B	Basic Air Conditioning: Troubleshooting	6
MECH 32B	Refrigeration Control Circuit Analysis	3

WELDING TECHNOLOGY CERTIFICATE

Total Units Required 48 - 49

Required Courses

MECH 88A	Introductory Trade Welding	8
MECH 88B	Beginning Trade Welding	8
MECH 88C	Intermediate Trade Welding	8
ENGR 73	Trade Technician Drafting Skills	3
INDUS 35	Mobile Hydraulics	4
MECH 15	Machine Tool Processes	4
MECH 60	Metal Trades Layout and Forming	5
ELEC 30	Fundamentals of Electricity	5
OR		
INDUS 45	Industrial Technology	5
INDUS 94	Industrial Mathematics	3
OR		
MATH 80	Elementary Algebra	4