Applied Science and Technology

Air Conditioning & Refrigeration Apprenticeship Automated Production & Manufacturing Processes Technology Automotive Technology Construction Technology Electrical/Electronics Technology Engineering Technology Environmental Technology Industrial Drawing/Computer Aided Design Industrial Technology Mechanized Agriculture Water Technology Welding Technology Woodworking/Cabinetmaking Technology Programs in the Applied Science and Technology Division prepare individuals for technical and leadership responsibilities within a broad range of industries including, but not limited to, manufacturing, food production, communications, transportation, energy, government, education, and utility services. Examples of job descriptions are production manager, quality control manager, plant/facility manager, industrial salesperson, industrial service representative, construction supervisor, safety manager, teacher, etc.

Students should develop programs with the aid of departmental counselor or advisor. Studies may lead to short-term career goals, the Certificate of Achievement or the Associate Degree. Students may also choose lower division courses that transfer to the Bachelor of Arts or Bachelor of Science Degree in Industrial Arts or Industrial Technology. Some classes listed as "not transferable" may actually transfer as electives in an Industrial Arts or Technology major. Check with the departmental counselors at the college you wish to transfer to for specific details.

CERTIFICATES OF COMPLETION

Certificates of Completion are awarded for completion of a class, or short sequence of classes. The Certificate provides evidence of training in a limited area of study. Employees find these certificates helpful in demonstrating to employers that they have upgraded their current skills or developed new skills in other areas. Certificates of Completion are issued in the following areas upon completion of the classes listed with a grade of C or better. Students may apply for the certificates in the AST Division Office upon completion of the required courses.

Air Condition/Heating/Refrigeration Certificate of Completion

Course Number	Title	Units
ACRF B54ab	Air Conditioning and Refrigeration	6.0

AutoCad Certificate of Completion

Required Courses: 8 units

Title	Units
Introduction to Industrial Drawing	
and Graphics	1.0
Introduction to Computer Aided Drafting	
and Design (CAD)	1.0
Computer Aided Drafting and Design	
(CAD)	3.0
Computer Aided Drafting and Design	
(CAD)	3.0
	Title Introduction to Industrial Drawing and Graphics Introduction to Computer Aided Drafting and Design (CAD) Computer Aided Drafting and Design (CAD) Computer Aided Drafting and Design (CAD)

Basic Automotive Maintenance and Service Certificate of Completion *Required Courses: 17 units*

Course Number	Title	Units
AUTO B90	Automotive Maintenance and Repair	12.0
INDT B90	Occupational Readiness	5.0

Basic Machine Tool Operations-Lathe, Mill Certificate of Completion Required Courses: 3 units

Course Number	Title	Units
APRD B1ab	Introduction to the Machine Tool Processes	3.0

Blueprint Reading and Layout for Welders Certificate of Completion Required Courses: 6 units

Course Number	Title	Units
WELD B54a	Blueprint Reading and Layout for Welders	3.0
WELD B54b	Template Development and Layout for	
	the Welder	3.0

Computer Numerical Control Programming Certificate of Completion Required Courses: 6 units

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Course Number	Title	Units
APRD B2	Introduction to Numerical Control and	
	Fundamentals of Programming	3.0
APRD B3	Computer Numerical Control	
	Milling Machine	3.0

Diesel and Farm Equipment Service and Repair Certificate of Completion *Required Courses: 17 units*

Course Number	Title	Units
AUTO B80	Diesel & Heavy Equipment Mechanics	12.0
INDT B90	Occupational Readiness	5.0

Gas Metal Arc/Gas Tungsten Arc Welding/Flux Core Arc Welding

Required Courses: 7.5 or 17 units

Course Number	Title	Units
WELD B1ab	Introduction to the Welding Processes	3.0
WELD B53ab	Shielded Metal Arc Welding	3.0
WELD B74a	TIG Welding	1.5
OR		
WELD B90	General Welding	12.0
INDT B90	Occupational Readiness	5.0

OSHA First Responder Awareness Level Certificate of Completion

Required Course: 3 units

Course Number	Title	Units
ENVT B1ab	Introduction to Environmental Technology	3.0

OSHA Hazardous Waste Operations & Emergency Response (HAZWOPER) 24 hour site Worker Certificate of Completion *Required Course: 1 unit*

Course Number	Title	Units
ENVT B10a	Hazardous Materials Awareness and Safety	1.0

OSHA HAZWOPER 40 Hour Site Worker Certificate of Completion

Required Courses: 4 units

Course Number	Title	Units
ENVT B10a	Hazardous Materials Awareness and Safety	1.0
ENVT B10b	Spill Control and Emergency Response	1.5
ENVT B10c	Decision Making in Emergencies	1.5

Programmable Logic Controllers (Basic PLC's) Certificate of Completion Required Courses: 6 units

Course Number	Title	Units
APRD B5	Introduction to Programmable Logic	
	Controllers (PLC)	3.0
APRD B61	Introduction to Process Control	3.0

Shielded Metal Arc Welding Certificate of Completion *Required Courses: 12 or 17*

Title	Units
Introduction to the Welding Processes	3.0
Structured Plate Certification	3.0
Blueprint Reading for Welders and	
Machinists	3.0
Template Development and Layout	
for the Welder	3.0
General Welding	12.0
Occupational Readiness	5.0
	Title Introduction to the Welding Processes Structured Plate Certification Blueprint Reading for Welders and Machinists Template Development and Layout for the Welder General Welding Occupational Readiness

Woodworking/Cabinetmaking Certificate of Completion

Required Courses: 6 units

Course Number	Title	Units
WOOD B1	Creative Woodworking	3.0
WOOD B2 or	Furniture and Cabinetmaking	3.0
WOOD B5	Intermediate Cabinetmaking	3.0

CERTIFICATES OF ACHIEVEMENT

These training programs are more comprehensive than Certificates of Completion and are designed for those who prefer career specialization and the earliest possible opportunity for job placement and/or the establishment of a small business. Students may continue toward more advanced courses, an Associate Degree, or transfer to a four-year institution.

Programs offering these specialized certificates include: Automotive Brakes and Wheel Alignment, Engine Overhaul, Automatic Transmission Repair, Tune-Up and Emission Control, Environmental Hazardous Materials Technology, Construction, Cabinetmaking, Electronics Technology, Automated Production and Manufacturing Processes, and Welding. Each program consists of basic requirements and suggested electives. Electives should be selected in consultation with faculty advisors and counselors. All courses must be completed with a grade of "C" or higher.

Upon completion of the requirements, the student may apply to the division office for a Certificate of Achievement. Certificates are awarded upon recommendation by lead instructors and the department chairperson.

Note: All students pursuing a Degree or Certificate of Achievement must take an Educational Planning Course. INDT B10, Introduction to Industrial Technology, is recommended to fulfill this requirement.

Automated Production And Manufacturing Processes Certificate Program Required Courses: 30 units

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Course Number	Title	Units
APRD B1ab	Introduction to Machine Tool Processes	3.0
APRD B4	Introduction to Automated Production	
	and Manufacturing Processes	3.0
APRD B5	Introduction to Programmable Electronic	
	Controllers (PLC)	3.0
APRD B2	Introduction to Numerical Control and	
	Fundamentals of Programming	3.0
APRD B3	Computer Numerical Control Milling	
	Machine	3.0
INDR B10	Introduction to Industrial Drawing and	
	Graphics	1.0
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
APRD B61	Introduction to Process Control	3.0
ELET B1	Fundamentals of Electronics (DC)	4.0
МАТН ВА	Elementary Algebra	3.0
INDT B10	Introduction to Industrial Technology	0.5

Electives: at least 2.5 units

Course Number	Title	Units
ENGL B1	Introductory Composition	4.0
WELD B54a	Blueprint Reading for Welders and	
	Machinists	3.0
WELD B1ab	Introduction tot he Welding Processes	3.0
INDR B20a	Computer Aided Drafting and Design	3.0
INDT B50	Managing Quality Organizations	3.0
INDT B249	Cooperative Work Experience Education	1.0
INDT B273	Special Problems in Machine Tool	
	Metal Working	2-3.0

Auto Brakes and Wheel Alignment Certificate Program

This program develops student's knowledge and skills in automotive brake and suspension systems operation, trouble-shooting, maintenance, repair, and wheel alignment procedures.

Required Courses: 24 units

Course Number	Title	Units
AUTO B8	Automotive Suspension, Steering	
	and Alignment	6.0
AUTO B103	Automotive and Light Truck Brake Systems	4.0
AUTO B64a or	Automotive Electricity	2.0

AUTO B14	Automotive Tune-Up: Electrical and	
	Ignitions (10.0)	
MATH B50 or	Modern College Arithmetic & Pre-algebra	3.0
Math Placement	Assessment Level 2 or above	
INDT B10 or	Introduction to Industrial Technology	0.5
Equivalent		

Electives: at least 0.5 or 8.5 units

Course Number	Title	Units
AUTO B66	Automotive Emission Control Devices	4.0
AUTO B2a or	Automotive Engine Overhaul	9.0
AUTO B75a &	Introduction to Engine Overhaul (3.0)	
AUTO B75b	Engine Repair Techniques (3.0)	
WELD B1ab	Introduction to the Welding Processes	3.0
WEXP B249	Cooperative Work Experience Education	1-4.0
INDT B275	Special Problems in Automotive	2-3.0

Auto Engine Overhaul Certificate Program

This program develops student's knowledge and skills in the areas of automotive and light truck engine overhaul and machining procedures. Program includes instruction in theory of operation, diagnostic, and repair procedures.

Required Courses: 24 units

For Day Students:

Course Number	Title	Units
AUTO B2a	Automotive Engine Overhaul	9.0
AUTO B2b	Automotive Engines Machining	9.0
MATH B50 or	Modern College Arithmetic & Pre-Algebra	3.0
Math Placement	Assessment Level 2 or above	
INDT B10 or	Introduction to Industrial Technology	0.5
Equivalent		

For Night Students:

Course Number	little	Units
AUTO B75a	Introduction to Engine Overhaul	3.0
AUTO B75b	Engine Repair Techniques	3.0
AUTO B75c	Advanced Engine Overhaul	3.0
AUTO B75d	Advanced Engine Machining	3.0
MATH B50 or	Modern College Arithmetic & Pre-Algebra	3.0
Math Placeme	nt Assessment Level 2 or above	

Electives: at least 2.5 units for day students and 9 units for night students.

Course Number	Title	Units
AUTO B14	Automotive Tune-Up: Electrical and	
	Ignitions	10.0
AUTO B63	Automotive Fuel Injection and Diagnosis	2.0
AUTO B64a	Automotive Electricity	2.0
AUTO B65	Automotive Emission Control Devices	4.0
INDT B249	Cooperative Work Experience Education	4.0
	Special Problems in Automotives	2-3.0



Automotive Power-Trains Certificate Program

This program develops student's knowledge and skills in the areas of automotive and light truck standard and automotive transmissions, differential and drive train components. Program includes instruction in theory of operation, diagnostic and repair procedures as well as complete repair procedures.

Required Courses: 24 units

Course Number	Title	Units
AUTO B12a	Automatic Transmissions Overhaul	
	and Service	8.0
AUTO B112b	Standard Transmissions and Power	
	Train Service	4.0
AUTO B14 or	Automotive Tune-Up: Electrical and Ignitic	ons
10.0		
AUTO B64a	Automotive Electricity (2.0)	
MATH B50 or	Modern College Arithmetic & Pre-Algebra	3.0
Math Placemen	t Assessment Level 2 or above	
INDT B10 or	Introduction to Industrial Technology	0.5
Equivalent		

Electives: at least 6.5 units if taking AUTO B64a instead of AUTO B14

Course Number	Title	Units
AUTO B8	Automotive Suspension, Steering	
	and Alignment	8 0
APRD B1ab	Introduction to Machine Tool Processes	3.0
AUTO B66	Automotive Computer Controls	4.0
AUTO B2a	Automotive Engine Overhaul	9.0
AUTO B75a	Introduction to Engine Overhaul	3.0
WEXP B249	Cooperative Work Experience Education	1-4.0
INDT B275	Special Problems in Automotive	2-3.0

Auto Tune-Up and Emission Systems Certificate Program

This program develops student's knowledge and skills in the areas of automotive and light truck tune-up and emission control systems. Program includes instruction in theory of ignition, fuel, and computer control systems as well as emission test procedures and complete diagnostic and repair procedures.

Required Courses: 26 units

Course Number	Title	Units
AUTO B14	Automotive Tune-Up: Electrical	
	and Ignitions	10.0
AUTO B15	Automotive Tune-Up: Fuel and Emissions	10.0
MATH B50 or	Modern College Arithmetic & Pre-Algebra	3.0
Math Placement	Assessment Level 2 or above	
INDT B10 or	Introduction to Industrial Technology	0.5
Equivalent		

Electives: at least 2.5 units

Course Number	Title	Units
AUTO B59	Automotive Air Conditioning	2.0
AUTO B65	Automotive Emission Control Devices	4.0
AUTO B75a or	Introduction to Engine Overhaul	3.0
AUTO B2a	Automotive Engine Overhaul (9.0)	
ELET B1	Fundamentals of Electronics (DC)	4.0
ENGL B1	Introductory Composition	4.0
COMS 50a	Introduction to the Microcomputer and	
	MS DOS	1.0
WEXP B 249	Cooperative Work Experience Education	1-4.0
INDT B 275	Special Problems in Automotives	1-3.0

Cabinetmaking Certificate Program *Required Courses: 33 units*

Course Number	Title	Units
WOOD B1	Beginning Hand Woodworking	3.0
WOOD B2	Furniture and Cabinetmaking	3.0
CNST B1	Introduction to Construction	3.0
CNST B4a &	Cabinetmaking and Millwork	4.0
CNST B4b or	Cabinetmaking and Millwork	4.0
WOOD B5 &	Intermediate Cabinetmaking (3.0)	
WOOD B65a &	Advanced Cabinetmaking (3.0)	
WOOD B65b	Advanced Cabinetmaking (3.0)	
ENGL	Approved Course	4.0
TECM B52 or	Introduction to Technical Mathematics	3.0
Equivalent		
INDR B10	Introduction to Industrial Drawing	
	and Graphics	1.0
INDT B10	Introduction to Industrial Technology	0.5

Electives: at least 6.5 or 7.5 units

Course Number	Title	Units
INDT B249	Cooperative Work Experience Education	1-4.0
INDT B274	Special Problems in Woodworking	2-3.0
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
INDR B20a	Computer Aided Drafting and Design	
	(CAD)	3.0
FORE B2	Natural Resources	3.0
ENGL B1	Introductory Composition	4.0

Construction Technology Certificate Program Required Courses: 30 units

Course Number	Title	Units
CNST B1	Introduction to Construction	3.0
CNST B2	Blueprint Reading and Estimating	3.0
WOOD B2	Furniture and Cabinetmaking	3.0
CNST B4a or	Cabinetmaking and Millwork	4.0
WOOD B5	Intermediate Cabinetmaking (3.0)	
INDT B249	Cooperative Work Experience Education	4.0
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
INDR B10	Introduction to Industrial Drawing	
	and Graphics	1.0
ARCH B55	Building Codes	3.0
MATH B50 or	Modern College Arithmetic & Pre-Algebra	3.0
Math Placement	Assessment Level 2 or above	
WOOD B2	Furniture and Cabinetmaking	3.0
INDT B10	Introduction to Industrial Technology	0.5

Electives: at least 1.5 to 2.5 units

Course Number	Title	Units
INDR B20a	Computer Aided Drafting and Design	
	(CAD)	3.0
ARCH B33	Architectural Computer Practice	3.0

Note: Students should consult with their counselors for best possible selections for their programs of study.

Electronics Technology Certificate Program Required Courses: 31.5 units

Requi	ea	Cours	ses: 31.5 units	
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Course Number	Title	Units
ELET B1	Fundamentals of Electronics (DC)	4.0

ELET B2	Fundamentals of Electronics (AC)	4.0
ELET B9	Semiconductor Circuit Analysis	4.0
ELET B12	Digital Logic	4.0
ELET B55	Electric Motors-Controls	4.0
ELET B66a	Electronic Communications Circuits	4.0
MATH BA or	Elementary Algebra	3.0
Equivalent		
COMS B50a	Introduction to Microcomputer and MS DOS	1.0
APRD B5	Introduction to Programmable Electronic	
	Controllers (PEC)	3.0
INDT B10	Introduction to Industrial Technology	0.5

Environmental Technology Certificate

Environmental Technology refers to the knowledge and skills that enable a person to work with hazardous materials safely and in compliance with governmental regulations in order to protect human health and the environment.

Required Courses: 36 units

Course Number	Title	Units
ENVT B49 or	Applied Chemistry	4.0
CHEM B49	Applied Chemistry	
ENVT B1ab	Introduction to Environmental Technology	3.0
ENVT B10a	Hazardous Materials Awareness and Safety	1.0
ENVT B10b	Spill Control and Emergency Response	1.5
ENVT B10c	Decision Making in Emergencies	1.5
ENVT B20	Hazardous Waste Generation, Reduction,	
	and Treatment	3.0
ENVT B30	Health Effects of Hazardous Materials	3.0
ENVT B15a	Right-to-Know Laws	1.5
ENVT B15b	Transportation and Storage of Hazardous	
	Materials	1.5
ENVT B15c	Air Quality Issues	1.0
ENVT B40a	Generator Requirements	1.5
ENVT B40b	Sampling and Analysis	1.5
ENVT B40c	Special Topics in Hazardous Waste	
	Management	1.0
BIOL B18	Essentials of Anatomy and Physiology	4.0
BIOL B7	Environment	3.0

Electives: at least 4 units

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Course Number	Title	Units
SPCH B1	Speech Communication	3.0
COMS B5	Introduction to Microcomputer Application	s 3.0
MGMT B65a	Basic Principles of English for Business/	
	Public Organization	1.0
MGMT B65b	Principles of Writing for Business/	
	Public Organization	1.0
MGMT B65c	Organizational Communications	1.0

Welding Certificate Program

Required Courses: 26 units

Course Number	Title	Units
WELD B1ab	Introduction to the Welding Processes	3.0
WELD B53ab	Shielded Metal Arc Welding	3.0
WELD B55ab	Structural Plate Certification	3.0
WELD B55cd	ASME Pipe Certification	3.0
WELD B74ab	TIG and MIG Welding	3.0
APRD B1a	Introduction to Machine Tool Processes	1.5
WELD B54a	Blueprint Reading for Welders & Machinists	3.0

MATH B50 or	Modern College Arithmetic & Pre-Algebra	3.0
Math Placement	Assessment Level 2 or above	
INDT B10	Introduction to Industrial Technology	0.5

Electives: at least 3 units

Title	Units
Approved Course	4.0
Introduction to Industrial Drawing	
and Graphics	1.0
Special Problems in Welding	2-3.0
Fundamentals of Electronics (DC)	4.0
API and Related Certification Testing	3.0
Template Development and Layout for	
the Welder	3.0
Hazardous Materials Awareness and Safety	1.0
Introduction to Automated Production and	
Manufacturing Processes	1.5
Introduction to Computer Aided Drafting	
and Design	1.0
Cooperative Work Experience Education	1.0
	Title Approved Course Introduction to Industrial Drawing and Graphics Special Problems in Welding Fundamentals of Electronics (DC) API and Related Certification Testing Template Development and Layout for the Welder Hazardous Materials Awareness and Safety Introduction to Automated Production and Manufacturing Processes Introduction to Computer Aided Drafting and Design Cooperative Work Experience Education

ASSOCIATE DEGREE PROGRAMS

Students are encouraged to continue their education beyond the Certificate of Achievement by taking additional technical and general education courses which lead to an Associate in Science or Associate in Arts Degree.

Students must comply with the requirements as shown in the catalog under Graduation Requirements. INDT B10, Introduction to Industrial Technology, is strongly recommended for all Industrial Technology majors. It will satisfy the educational planning requirement for graduation. Counselors/ advisors will assist the student in planning for an Associate Degree.

ASSOCIATE IN ARTS DEGREE PROGRAMS Industrial Drawing Required Courses: 18 units

Course Number	Title	Units
INDR B10	Introduction to Industrial Drawing	
	and Graphics	1.0
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
INDR B20a	Computer Aided Drafting and Design	
	(CAD)	3.0
INDR B50	Process Piping	3.0
INDR B51	Electrical Design I	2.5
INDR B52a	Geographic Information Systems (GIS)	3.0

Electives: at least 4.5 units

Course Number	Title	Units
INDR B16	Introduction to 3D Animation	1.0
INDR B20b	Computer Aided Drafting and Design	
	(CAD)	3.0
INDR B30b	Industrial Drawing	3.0

ASSOCIATE IN SCIENCE DEGREE PROGRAMS Environmental Technology

Environmental Technology refers to the knowledge and skills that enable a person to work with hazardous materials safely and in compliance with governmental regulations in order to protect human health and the environment.

Required Courses: 36 units

Course Number	Title	Units
ENVT B49 or	Applied Chemistry	4.0
CHEM B49	Applied Chemistry	
ENVT B1ab	Introduction to Environmental Technology	3.0
ENVT B10a	Hazardous Materials Awareness and Safety	1.0
ENVT B10b	Spill Control and Emergency Response	1.5
ENVT B10c	Decision Making in Emergencies	1.5
ENVT B20	Hazardous Waste Generation, Reduction,	
	and Treatment	3.0
ENVT B30	Health Effects of Hazardous Materials	3.0
ENVT B15a	Right-to-Know Laws	1.5
ENVT B15b	Transportation and Storage of Hazardous	
	Materials	1.5
ENVT B15c	Air Quality Issues	1.0
ENVT B40a	Generator Requirements	1.5
ENVT B40b	Sampling and Analysis	1.5
ENVT B40c	Special Topics in Hazardous Waste	
	Management	1.0
BIOL B18	Essentials of Anatomy and Physiology	4.0
BIOL B7	Environment	3.0

Electives: at least 4 units

Course Number	Title	Units
COMS B5	Introduction to Microcomputer Applications	3.0
MGMT B65a	Basic Principles of English for Business/	
	Public Organization	1.0
MGMT B65b	Principles of Writing for Business/	
	Public Organization	1.0
MGMT B65c	Organizational Communications	1.0

Industrial Technology (General)

Required Courses: 30 units

Course Number	Title	Units
APRD B1ab	Introduction to Machine Tool Processes	3.0
APRD B4	Introduction to Automated Production	
	and Manufacturing Processes	1.5
APRD B5	Introduction to Programmable Logic	
	Controllers (PLC)	3.0
ELET B1	Fundamentals of Electronics (DC)	4.0
INDR B10	Introduction to Industrial Drawing and	
	Graphics	1.0
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
INDR B20a	Computer Aided Drafting and Design	
	(CAD)	3.0
ENVT B1ab	Introduction to Environmental Technology	3.0
WELD B1ab	Introduction to the Welding Processes	3.0
COMS B12	Introduction to Programming with BASIC	3.0

Electives: at least 4.5 units

Course Number	Title	Units
INDR B20b	Computer Aided Drafting and Design	
	(CAD)	3.0
APRD B2	Introduction to Numerical Control and	
	Fundamentals of Programming	3.0
WOOD B2	Furniture and Cabinetmaking	3.0
ENVT B10a	Hazardous Materials Awareness and Safety	1.0

AUTO B1	Basic Auto	3.0
CNST B1	Introduction to Construction	3.0
COMS B5	Introduction to Microcomputer Applications	3.0
MGMT B43 or	Principles of Organization and Management	3.0
BSAD B20	Introduction to Business	
STDV B51	Job Search Strategies	1.0
INDT B50	Managing Quality Organizations	3.0

Industrial Technology Automated Production And Manufacturing Processes Option *Required Courses: 30 units*

Course Number	Title	Units
APRD B1ab	Introduction to Machine Tool Processes	3.0
APRD B4	Introduction to Automated Production and	
	Manufacturing Processes	3.0
APRD B5	Introduction to Programmable Logic	
	Controllers (PLC)	3.0
APRD B2	Introduction to Numerical Control and	
	Fundamentals of Programming	3.0
APRD B3	Computer Numerical Control Milling	
	Machine	3.0
INDR B10	Introduction to Industrial Drawing and	
	Graphics	1.0
INDR B11	Introduction to Computer Aided Drafting an	ıd
	Design (CAD)	1.0
WELD B54a	Blueprint Reading for Welders & Machinist	s 3.0
APRD B61	Introduction to Process Control	3.0
ELET B1	Fundamentals of Electronics (DC)	4.0

Electives: at least 3 units

Course Number	Title	Units
WELD B53ab	Shielded Metal Arc Welding	3.0
INDR B20a	Computer Aided Drafting and Design	
	(CAD)	3.0
INDT B50	Managing Quality Organizations	3.0
WEXP B249ab	Cooperative Work Experience Education	1.0
INDT B273	Special Problems in Tool Metal Working	2-3.0

Industrial Technology Automotive Option

Required Courses: 32 units

Select From:

Course Number	Title	Units
AUTO B2a	Automotive Engine Overhaul	9.0
AUTO B2b	Automotive Engines Machining	9.0
AUTO B103	Automotive and Light Truck Brake Systems	s 4.0
AUTO B8	Automotive Suspension, Steering and	
	Alignment	8.0
AUTO B12a	Automatic Transmissions Overhaul and	
	Service	8.0
AUTO B112b	Standard Transmissions and Power Train	
	Service	4.0
AUTO B14	Automotive Tune-Up: Electrical and	
	Ignitions	10.0
AUTO B15	Automotive Tune-Up: Fuel and Emissions	10.0
ELET B1	Fundamentals of Electronics (DC)	4.0

Industrial Technology Construction Option *Required Courses: 30 units*

Course Number	Title	Units
CNST B1	Introduction to Construction	3.0
CNST B2	Blueprint Reading and Estimating	3.0

CNST B4a or	Cabinetmaking and Millwork	4.0
WOOD B55	Intermediate Cabinetmaking (3.0)	
CNST B55a or	Residential Construction	5.0
CNST B55b or	Residential Construction (5.0)	
WEXP B249	Cooperative Work Experience Education (4.0)
INDR B10	Introduction to Industrial Drawing and	
	Graphics	1.0
ARCH B55	Building Codes	3.0
WOOD B2	Furniture and Cabinetmaking	3.0
INDT B10	Introduction to Industrial Technology	0.5

Electives: at least 7.5 units

Course Number	Title	Units
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
INDR B20a	Computer Aided Drafting and Design	
	(CAD)	3.0
ARCH B56	Building and Related Codes	3.0

Industrial Technology Electronics Option Required Courses: 30 units

Course Number	Title	Units
ELET B1	Fundamentals of Electronics (DC)	4.0
ELET B2	Fundamentals of Electronics (AC)	4.0
ELET B9	Semiconductor Circuit Analysis	4.0
ELET B12	Digital Logic	4.0
ELET B66a	Electronic Communications Circuit	4.0
ELET B66b	Electronic Communications Systems	4.0
APRD B5	Introduction to Programmable Logic	
	Controllers (PLC)	3.0

Electives: at least 3 units

Course Number	Title	Units
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
MATH BC	Plane Trigonometry	3.0
APRD B4	Introduction to Automated Production	
	and Manufacturing Processes	3.0

Industrial Technology Industrial Drawing Option Required Courses: 30 units

Course Number	Title	Units
INDR B10	Introduction to Industrial Drawing and	
	Graphics	1.0
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
INDR B20a	Computer Aided Drafting and Design	
	(CAD)	3.0
INDR B20b	Computer Aided Drafting and Design	
	(CAD)	3.0
INDR B30b	Industrial Drawing	3.0
INDR B50	Process Piping Drafting	4.0
MATH BC	Plane Trigonometry	3.0
INDR B51	Electrical Design I	2.5
INDR B52	Geographic Information Systems (GIS)	3.0
APRD B1ab or	Introduction to Machine Tool Processes	3.0
WOOD B2	Furniture and Cabinetmaking	
COMS B5	Introduction to Microcomputer Application	s 3.0

Electives: at least 0.5 unit

Course Number	Title	Units
ENGR B24	Engineering Graphics and Descriptive	
	Geometry	2.0
WELD B1ab	Introduction to the Welding Processes	3.0
APRD B4	Introduction to Automated Production and	
	Manufacturing Processes	3.0

Suggested Program for Industrial Technology Industrial Drawing Option

First Semester

Course Number	Title	Units
INDR B10	Introduction to Industrial Drawing and	
	Graphics	1.0
INDR B11	Introduction to Computer Aided Drafting	and
	Design (CAD)	1.0
MATH BD	Intermediate Algebra	4.0

Second Semester

Course Number	Title	Units
INDR B30b	Industrial Drawing	3.0
INDR B20a	Computer Aided Drafting and Design	
	(CAD)	3.0
MATH BC	Plane Trigonometry	3.0
INDR B50 or	Process Piping Drafting	4.0
INDR B52	Geographic Information Systems (GIS)	3.0

Third Semester

Course Number	Title	Units
INDR B50 or	Process Piping Drafting	4.0
INDR B52	Geographic Information Systems (GIS)	3.0
INDR B51	Electrical Design	3.0

Fourth Semester

Course Number	Title	Units
COMS B5	Introduction to Microcomputer Applications	s 3.0
	General Education	

Industrial Technology Welding Option Required Courses: 31-33 units

Course Number	Title	Units
WELD B1ab	Introduction to the Welding Processes	3.0
WELD B53ab	Shielded Metal Arc Welding	3.0
WELD B55ab	Structural Plate Certification	3.0
WELD B55cd	ASME Pipe Certification	3.0
WELD B74ab	TIG and MIG Welding	3.0
WELD B54a	Blueprint Reading for Welders & Machinist	s 3.0
APRD B1ab	Introduction to Machine Tool Processes	3.0
INDR B10	Introduction to Industrial Drawing and	
	Graphics	1.0
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
APRD B4	Introduction to Automated Production and	
	Manufacturing Processes	3.0
ENVT B1ab	Introduction to Environmental Technology	3.0
ENVT B10a	Hazardous Materials Awareness and Safety	1.0
INDT B271	Special Problems in Welding	2-3.0

Industrial Technology Woodworking and Cabinetmaking Option

Required Courses. 50 units		
Course Number	Title	Units
WOOD B1	Creative Woodworking	3.0
WOOD B2	Furniture and Cabinetmaking	3.0
WOOD B5	Intermediate Cabinetmaking	3.0
WOOD B65a	Advanced Cabinetmaking	3.0
WOOD B65b	Advanced Cabinetmaking	3.0
FORE B1	Introduction to Forestry	3.0
INDR B11	Introduction to Computer Aided Drafting	and
	Design (CAD)	1.0
INDR B20a	Computer Aided Drafting and Design	
	(CAD)	3.0
INDR B10	Introduction to Industrial Drawing and	
	Graphics	1.0
CNST B1	Introduction to Construction	3.0

Electives: at least 4 units

Course Number	Title	Units
FORE B2	Natural Resources	3.0
INDR B30b	Industrial Drawing	3.0
APRD B1ab	Introduction to Machine Tool Processes	3.0

ENGINEERING TECHNOLOGY

Cal Poly Pomona; California State University, Sacramento; Cogswell College; Northrop University Engineering technologists and engineering technicians are members of a technical team that also includes scientists, engineers and craftsmen. The members of the technical team perform job functions that are complementary and sometimes overlapping. By virtue of their education, training and interests, engineering technologists and engineering technicians are usually differentiated as follows:

An engineering technologist uses applied and basic training in mathematics, science, and engineering classes, engineering methods learned through classes and experience, and developed technical (manipulative) skills in direct support of engineering activities. A Bachelor of Science degree in Engineering Technology is required.

An engineering technician operates in a support role to aid in design, production, manufacturing, operations, and maintenance. Under professional direction, the engineering technician conducts tests, trouble shooting and analysis, and other similar projects, or carries out functions such as drafting, surveying, designing and technical sales. An Associate in Science degree or a Certificate of Engineering Technology is required.

Bakersfield College offers courses required for two years of engineering technology education. Completion of these courses, called the "engineering technology core" prepares students either for transfer to the colleges and universities offering bachelor's degrees in Engineering Technology, or for completion of an Associate in Science degree in Engineering Technology or certificate with specializations in electronics, industrial drawing, or petroleum. A beginning engineering technology student should have completed high school mathematics through intermediate algebra or MATH BD at Bakersfield College, one year of high school drafting or INDR B10 at Bakersfield College, and be eligible for ENGL B1.

The following courses are required to satisfy the engineering technology core and Associate in Science program:

Course Number	Title	Units
ENGR B48	Engineering Orientation	1.0
ENGR B45	Properties of Materials	3.0
ENGR B24 or	Engineering Graphics and Descriptive	
	Geometry	2.0
INDR B30b	Industrial Drawing (3.0)	
INDR B11	Introduction to Computer Aided Drafting	
	and Design (CAD)	1.0
CHEM B2a	Introductory General Chemistry	5.0
PHYS B2a	General Physics-Mechanics and Heat	4.0
PHYS B2b	General Physics-Sound, Light, Electricity,	
	Magnetism, Modern Physics	4.0
MATH* B6ab	Analytic Geometry and Calculus	8.0
COMS B11 or	Introduction to Programming with Pascal	3.0
COMS B13	Introduction to Programming with	
	FORTRAN	

The following are highly recommended:

Course Number	Title	Units
APRD B1a	Introduction to Machine Tool Processes	1.5
WELD B1ab	Introduction to the Welding Processes	3.0
APRD B4	Introduction to Automated Production and	
	Manufacturing Processes	3.0

*Students in certificate and/or Associate in Science degree programs may be able to substitute the following courses for the calculus requirement:

Course Number	Title	Units
MATH BC	Plane Trigonometry	3.0
MATH B1	Mathematical Analysis	4.0
MATH B22	Elementary Probability and Statistics	5.0

In addition, nine or more units from the following list of approved programs and/or subject areas are to be selected. See counselor or advisor for specific courses.

> Accounting Electrical Technology Auto Mechanics Industrial Technology Drafting Technology Computer Studies Construction Crafts Technology Machine Tool/Shop Welding and Cutting Petroleum Farm Mechanics Mechanical Technology

APPRENTICESHIP PROGRAMS

Apprenticeship courses are designed for indentured apprentices under the Shelley-Maloney California Apprenticeship Standards Act. The Apprentice Agreement states that the student will supplement on-the-job training with related classroom instruction during each year of apprenticeship.

Apprentice classes meet three to eight hours per week and yield two to six units of credit. Joint Apprenticeship Committees administering each program are composed of representation from labor, management, California State Division of Apprenticeship Standards, and Bakersfield College. These committees adopt state approved standards for operation and assure equal opportunity for applicants. Related training in apprenticeable occupations, in addition to those listed below, may be offered as the need arises.

Information for entry into apprenticeship programs may be obtained from the college coordinator of apprenticeship training. Interested persons are encouraged to apply for any of these programs and may contact the BC Apprenticeship Coordinator at 395-4408 for further information.

Linita

Unite

Bricklayers/Tilesetters Carpentry Electricians Operating Engineers Plumbers and Steamfitters Sheet Metal

ASSOCIATE DEGREE PROGRAM

	Onits
Apprenticeship classes for duration of apprentice period (45 units maximum)	12-45
Work Experience (four semesters, maximum of 16 units)	4-16
Related technical subjects as recommended by JAC	0-6

In addition, students must comply with the requirements as shown in the catalog under Graduation Requirements. The departmental counselor can assist the student in planning for the A.A. degree.

CERTIFICATE PROGRAM

	Units
Apprenticeship classes for duration of apprentice period	12-45
Work Experience	16

Electives (as recommended by JAC) to reach 30 units total (if needed).

COURSE DESCRIPTIONS

The following abbreviations are commonly used in the course descriptions: **lect** lecture; **lab** laboratory; **demo** demonstration; **Repeat** repeatability (see policy on course repetition); **CCS** Course Classification System. Hours given in parentheses are total hours for the course. Hours lecture, lab, etc., are hours required per week usually. **Offered:** F=course is offered fall semester; S=course is offered spring semester; SS=course is offered summer session. If there is no designation, the course is offered irregularly. Check with the department for information. Many classes are offered occasionally during the summer. Check the summer class schedule for additional course listings. Prerequisites are expressed as minimum requirements. See page 40 for a complete explanation. (CSU) indicates transferable to California State Universities; (UC) indicates transferable to University of California.

AIR CONDITIONING AND REFRIGERATION ACRF B54a-B54b Air Conditioning and Refrigeration (3-3 units)

Principles of refrigeration and air conditioning applied to domestic and commercial systems. Repair and maintenance of major systems components and controls. **Prerequisite:** ACRF B54b: ACRF B54a. **Recommended:** ACRF B54a: Math BA or equivalent (may be taken concurrently), ELET B1. **Hours:** (108-108) 1 lect, 5 lab. **Offered:** B54a F; B54b S. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Not degree applicable.

AUTOMATED PRODUCTION AND MANUFACTURING PROCESSES TECHNOLOGY APRD B1a Introduction to Machine Tool Processes (1.5 units)

Basic machine tool technology, including the use of precision measuring instruments, drilling machines, and lathes. **Recommended:** Reading Level 5 or 6. **Hours:** (54) 1 lect/demo; 2 lab. **Offered:** F. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

APRD B1b Introduction to Machine Tool Processes (1.5 units)

Basic machine tool technology emphasizing the use of lathes and vertical milling machines. **Prerequisite:** APRD B1a. **Hours:** (54) 1 lect; 2 lab. **Offered:** S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

APRD B2 Introduction to Numerical Control and Fundamentals of Programming (3 units)

Set-up, operation, and programming of a computer numerical control lathe. **Recommended:** Reading Level 5 or 6. Concurrent enrollment in APRD B1a or evaluation by instructor. **Hours:** (72) 3 lect, 1 lab by arrangement. **Offered:** F. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

APRD B3 Computer Numerical Control Milling Machine (3 units)

Set-up, operation, and programming of a computer numerical control (CNC) 3-axis milling machine including conversational and EIA programming. **Recommended:** Reading Level 5 or 6. Concurrent enrollment in APRD B1a or evaluation by instructor. **Hours:** (72) 3 lect, 1 lab by arrangement. **Offered:** S. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

APRD B4 Introduction to Automated Production and Manufacturing Processes (3 units)

Introduction to fundamental concepts of computer integrated manufacturing including computer numerical control machine tools (CNC), computer aided drafting and design (CAD), computer aided manufacturing (CAM), programmable logic control (PLC), servo/non-servo robots, vision inspection, pneumatics, operation of the Bakersfield College CIM cell. **Recommended:** Reading Level 5 or 6. **Hours:** (72) 3 lect, 1 lab . **Offered:** F, S. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

APRD B5 Introduction to Programmable Logic Controllers (PLC) (3 units)

The function and application of programmable electronic controllers (PEC). Theory on the development and dynamics of the programmable electronic controller. Programming with ladder logic using a teach pendant and personal computer to perform tasks with a Mercury robot and training simulator. **Recommended:** Reading Level 5 or 6. **Hours:** (72) 3 lect, 1 lab. **Offered:** F, S. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

APRD B61 Introduction to Process Control (3 units)

Introduction to the function and application of the Alien Bradley SLC-500 series of programmable controllers. Programming with Rockwell Software's RSLogix-500 software. Control of discrete and analog I/O by a closed loop Proportional Integral Derivative (PID) controller as well as a remote PLC controller. **Prerequisite:** APRD B5 or evaluation by instructor of student's PLC programming skills. **Hours:** (72) 3 lect, 1 lab. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO

AUTO B1 Introduction to Automotive Technology (4 units)

Introduction to the operation and maintenance of the modern automobile with emphasis on the theory of the basic operating systems. These systems include a) the engine and its systems (lubrication, cooling, fuel, and emission controls), b) electrical systems (battery, starting, charging, lighting, and ignition, c) the chassis (suspension, wheel alignment, steering, brakes, tires and wheels, d) the drive line (clutch, standard and automatic transmissions, universal joints and differential). **Recommended:** Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 lab. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

AUTO B2a Automotive Engine Overhaul (9 units)

Preparation for ASE A1 exam. Theory of internal combustion, piston-type engine design and maintenance. Practice in engine overhaul procedures and mechanical problem diagnosis. **Recommended:** AUTO B1 with minimum grade of "C" or evaluation of previous auto experience by instructor. **Hours:** (270) 6 lect, 9 lab. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

AUTO B2b Automotive Engines Machining (9 units)

Prepares for ASE M1G, M2g, M3g exams. Advanced engine design, theory of machining techniques and engine machining procedures. Practice in automotive machining operations. **Prerequisite:** AUTO B2a. **Hours:** (270) 6 lect, 9 lab. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

AUTO B8 Automotive Suspension, Steering and Alignment (8 units)

Prepares for AES A4 exam. Principles of design and operation, techniques for repair and replacement of 4-wheel suspension components. Alignment procedures using modern computerized 4-wheel alignment equipment. **Recommended:** Reading Level 5 or 6. **Hours:** (216) 6 lect, 6 lab. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

AUTO B12a Automatic Transmissions Overhaul and Service (8 units)

Prepares for ASE A5 exam. Automatic transmissions and transaxles, computer controls, two-, three-, and four-speed transmissions, overdrive, and all related components. Successful completion should enable the student to pass the National Institute of Service Excellence test. **Recommended:** Reading Level 5 or 6. **Hours:** (216) 6 lect, 6 lab. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

AUTO B14 Automotive Tune-Up: Electrical and Ignitions (10 units)

Prepares for ASE A6, A8 exams. Fundamentals of automotive electrical/electronic component repair. Includes electrical theory, diagnosis and repair of battery, starting, charging and ignition systems including computer controlled systems. Laboratory emphasis on computer diagnostic equipment. **Recommended:** AUTO B1 or one year automotive repair work experience. **Hours:** (270) 8 lect, 7 lab. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

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AUTO B15 Automotive Tune-Up: Fuel and Emissions (10 units)

Prepares for ASE A8 exam. Theory, operation, and servicing of automotive fuel systems, computer controlled fuel systems, emission controls, and advanced engine performance. **Recommended:** AUTO B1 with a grade of "C" or evaluation by instructor of previous auto experience. **Hours:** (270) 8 lect, 7 lab. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

AUTO B56ab Diesel Engines and Systems Basics (2-2 units)

Diesel technology used in agriculture and transportation industries, covers principles of operation, diagnosis and service. **Recommended:** Reading Level 5 or 6. **Hours:** (36-36) 2 lect, 2 lab for 9 weeks. **CCS:** Occupational Education. **Not Transferable:** Not degree applicable.

AUTO B59 Automotive Air Conditioning (2 units) Prepares for ASE A7 exam. Safety, principles and theory of automotive air conditioning systems, laboratory practice in the installation, service and repair of automotive air conditioning components. **Recommended:** Reading Level 5 or 6. **Hours:** (54) 2 lect, 1 lab. **Offered:** F, S. **CCS:** Occupational

Education. Not Transferable: Associate Degree only.

Prepares for ASE A2 exam. Entry-level program providing

technical instruction in diagnosis and repairs of automatic transmissions. **Recommended:** Reading Level 5 or 6. **Hours:** (54) 1.5 lect, 1.5 lab. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B63 Automotive Fuel Injection and Diagnosis (2 units)

Introduction to overhaul and service of fuel injection and carburetor systems including fuel tank, lines and pumps. **Recommended:** AUTO B1 or evaluation by instructor of automotive experience. Reading Level 5 or 6. **Hours:** (54) 1.5 lect, 1.5 lab. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

Electricity (2 units)

Prepares for ASE A6 exam. Fundamentals of automotive electronics and electrical components including ignitions, computers, batteries, alternators, starters. Laboratory emphasis on testing and servicing of electrical equipment. **Recommended:** Reading Level 5 or 6. **Hours:** (54) 1.5 lect, 1.5 lab. **Offered:** F. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B64b Advanced Automotive Electronics (2 units)

Course is directed toward the student already possessing a basic electrical knowledge. Lab will emphasize troubleshooting current auto electronic systems, utilizing the digital multimeter, lab oscilloscope and logic probe. Student will learn electronic components, analog/digital circuit theory and testing. **Prerequisite:** AUTO B64a or AUTO B66 or two years experience in the automotive service field. **Hours:** (54) 1.5 lect, 1.5 lab. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B65 Automotive Emission Control Devices (4 units)

Prepares for state smog license. Installation, operation, and repair of automotive pollution control devices including crankcase devices, exhaust emissions, and vapor control systems. Meets the California Air Resources (C.A.R.B.) preexamination requirements. **Recommended:** AUTO B1 or one year automotive repair work experience. **Hours:** (108) 3 lect, 3 lab. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

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AUTO B66 Automotive Computer Controls (4 units)

Prepares for ASE L1 exam. Operation and diagnosis of domestic and import computerized engine control systems. Includes electronic devices, control modules, sensors, and computerized fuel systems. Laboratory includes electronic diagnosis, computer code analysis, and fuel system diagnosis. **Recommended:** AUTO B1 or one year automotive experience. **Hours:** (108) 3 lect, 3 lab. **Offered:** F, S. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B67abc Motor Sports Dynamics/Technical Preparation (1-1-1 units)

Explore operation and diagnosis of race car suspension and engine performance. Explore the various methods of race team management and organization. **Recommended:** Reading Level 5 or 6. **Hours:** (18-18-18) 3 lect for 6 weeks. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B68 Race Car Construction and Engineering (2 units)

Class will engineer race car systems, fabricate and assemble race car using skills and theories taught in AUTO B67abc, test tuning and suspension theories at local race track using professional driver for consistency. **Prerequisite:** AUTO B67abc. **Hours:** (54) 1 lect, 2 lab. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B73 Wheel Alignment (2 units)

Prepares for ASE A4 exam. Principles of front end and four wheel alignment including repair, replacement and adjustment of suspension components. Instruction and use of computerized 4-wheel alignment machine. **Recommended:** Reading Level 5 or 6. **Hours:** (54) 1.5 lect, 1.5 lab. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B74 Automotive Disc and Drum Brake Service (2 units)

Prepares for ASE A5 exam. Principles of operation and diagnosis, repair, and replacement of automotive brake system components. **Recommended:** Reading Level 5 or 6. **Hours:** (54) 1.5 lect, 1.5 lab. **Offered:** F. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B75a Introduction to Engine Overhaul (3 units)

Prepares for ASE A1 exam. Theory of internal combustion, piston-type engine design and maintenance. Engine disassembly for familiarization purposes. **Recommended:** AUTO B1 or high school automotive class, or one year automotive repair work experience. **Hours:** (108) 2 lect, 4 lab. **Offered:** F. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B75b Engine Repair Techniques (3 units) Prepares for ASE A1 exam. Theory of internal combustion, piston-type engine repair techniques. Practice in overhaul procedures, mechanical problem diagnosis and measuring techniques. Prerequisite: AUTO B75a. Hours: (108) 2 lect, 4 lab. Offered: F. Repeat: 1. CCS: Occupational Education. Not Transferable: Associate Degree only.

AUTO B75c Advanced Engine Overhaul (3 units) Prepares for ASE A1 exam. Application of engine overhaul theory and procedures, component tolerancing, reassembly and break-in procedures. **Prerequisite:** AUTO B75b. **Hours:** (108) 2 lect, 4 lab. **Offered:** F. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B75d Advanced Engine Machining (3 units) Prepares for ASE A1 exam. Advanced engine design, theory of machining techniques and engine machining procedures. Practice in automotive machining. **Prerequisite:** AUTO B75c. **Hours:** (108) 2 lect, 4 lab. **Offered:** F. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B76 Performance Engine Building (2 units)

Theory of high performance engines and machining skills necessary to modify stock production engines for maximum output. Test sessions at local racetrack will show applied theory and skills. **Prerequisite:** AUTO B2a and AUTO B2b or AUTO B75abcd. **Hours:** (54) 1 lect, 2 lab. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B80 Diesel and Heavy Equipment Mechanics (12 units)

Repair service on agriculture equipment. Emphasizes maintenance, repair, trouble-shooting, design, safety, tool usage, equipment operation, machine tool usage, welding and air conditioning. **Prerequisites:** Concurrent enrollment in INDT B90. **Hours:** (600) 6 lect, 19 lab for 24 weeks. Open entry/ open exit. Field trips required. **Offered:** F, S. **CCS:** Occupational Education. **Not Transferable:** Not degree applicable.

AUTO B90 Automotive Maintenance and Repair (12 units)

Engine components, chassis, brake, air conditioning service and basic engine tune-up. **Prerequisite:** Concurrent enrollment in INDT B90. **Hours:** (450) 5 lect, 20 lab. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B103 Automotive and Light Truck Brake Systems (4 units)

Prepares for ASE A5 exam. A comprehensive course in automotive and light truck brake systems, designed to give the student the skills and technical knowledge to diagnose, repair or replace all the brake components on late model vehicles. **Recommended:** Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 lab. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

AUTO B112b Standard Transmissions and Power Train Service (4 units)

Prepares for ASE A3 exam. Standard transmissions and transaxles, clutches, "U" joints, differentials and all related components. Successful completion should enable the student to pass the National Institute of Service Excellence test. **Recommended:** Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 lab. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

CONSTRUCTION TECHNOLOGY

Credit limitations may apply. For specific information see a counselor.

CNST B1 Introduction to Construction (3 units)

Basic concepts of the construction industry. Overview of careers in construction, planning and layout, foundations and concrete, and light frame construction. **Recommended:** Reading Level 5 or 6 or evaluation by instructor. **Hours:** (54) 3 lect. Field trips required. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

CNST B2 Estimating and Scheduling (3 units)

Techniques in estimating and scheduling for the building industry. Plan reading and the extraction of the information necessary to calculate quantities and costs are covered. The preparation of a cost breakdown for the use of a financial institution and a production schedule for the projects is completed in the class. The use of computer programs to calculate the cost and keep track of the scheduling is explored and practiced. Practice and theory are pursued. **Recommended:** CNST B1 or one year work experience in the construction related industry. **Hours:** (54) 3 lect. **Offered:** S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

CNST B3a Plumbing for Residential Construction (1.5 units)

The study and discussion of local building codes, along with developing the basic skills of beginning students in the knowledge of plumbing materials, tools and equipment together with the basic technical knowledge required to enter the plumbing industry. Emphasis is on how to make all the common joints, and install the systems common to the plumbing trade as well as how to install finished fixtures and appliances. **Prerequisites:** CNST B1, CNST B2, or evaluation by instructor. **Hours:** (27) 3 lect for 9 weeks. Field trips

required. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

CNST B3b Electrical for Residential Construction (1.5 units)

The study and discussion of local building codes as related to residential electrical wiring, along with developing the basic skills of beginning students in the knowledge of electrical wiring materials, tools, and equipment together with the basic technical knowledge required to enter the electrical wiring industry. The student will learn the basic theory of electricity, and how to install the system most commonly used in the residential electrical trade and how to install finish electrical fixtures and appliances. **Prerequisites:** CNST B1, CNST B2 or evaluation by instructor. **Hours:** (27) 3 lect for 9 weeks. Field trips required. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

CNST B4a Cabinetmaking and Millwork (4 units)

A highly structured, intermediate level course in cabinetmaking and millwork designed to prepare students for employment in the cabinet/construction industry. Special attention to state-of-the-art techniques. **Prerequisites:** WOOD B2 or equivalent or evaluation by instructor. **Recommended:** Prior experience. **Hours:** (144) 3 lect, 5 lab. Field trips required. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

CNST B4b Cabinetmaking and Millwork (4 units)

An advanced course in cabinetmaking, utilizing machine and hand techniques necessary for top- end construction. Residential and non-residential type cabinets and the economical use of solid lumber; architectural millwork such as frame and panel wainscot, built-in furniture, desks, bars, doors, and windows; commercial applications such as store fixtures, counters, and reception desks; computer-aided cabinet design. **Prerequisites:** CNST B4a or evaluation by instructor. **Hours:** (144) 3 lect, 5 lab. Field trips required. **Repeat:** 1. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

CNST B55a-B55b Residential Construction (5-5 units)

The use of different trades in the actual construction of various projects. The theory will be discussed and then applied to the project. All trades necessary to the completion of a residential structure will be experienced. The trades involved will include, but not be limited to, concrete, framing, plumbing, electrical, interior and exterior finish, insulation, and roofing. Alternative materials and methods will be used to complete the projects. The student can enroll mid-year and take the semesters out of sequence. **Prerequisites:** CNST B 1, CNST B2. **Hours:** (180-180) 3 lect, 7 lab. Field trips required. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

ELECTRICAL TECHNOLOGY

Credit limitations may apply. For specific information see a counselor.

ELET B1 Fundamentals of Electronics (DC) (4 units)

Introduction to electricity including electrostatics, direct current circuits, resistive alternating current circuits, electrical circuit calculations, electrical measurements, and use of test equipment. **Recommended:** Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 lab. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ELET B2 Fundamentals of Electronics (AC) (4 units)

Direct and alternating current circuit analysis using network theorems in resistive and reactive circuits. Includes study of resonance, power factor correction, and passive filters. **Prerequisite:** ELET B1 with a grade of "C" or equivalent background in electricity/electronics. **Hours:** (108) 3 lect, 3 lab. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ELET B9 Semiconductor Circuit Analysis (4 units)

Characteristics and applications of semiconductor electronic devices including operational amplifiers and other linear integrated circuits in analog circuits including power supplies, amplifiers, oscillators, and active filters. **Prerequisite:** ELET B2 with a grade of "C." **Recommended:** ELET B1. **Hours:** (108) 3 lect, 3 lab. **Offered:** S. **Repeat:** 2. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ELET B12 Digital Logic (4 units)

Number systems, boolean logic, and fundamentals of digital devices; basic applications of logic devices in computers and control systems. Course includes an introduction to microprocessors and their applications. **Hours:** (108) 3 lect, 3 lab. **Offered:** F. **Repeat:** 2. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ELET B55 Electric Motors - Controls (4 units)

Basic principles of design and construction, operating characteristics, efficiency and application of direct current and alternating current machines. Emphasis is placed on programmable, solid state, and electromechanical motor controllers. **Prerequisite**: ELET B1. **Recommended**: Reading level 5 or 6. **Hours**: (108) 3 lect, 3 lab. **CCS**: Occupational Education. **Not Transferable**: Associate Degree only.

ELET B56 Introduction to Industrial Measurement and Control (1.5 units)

Basic principles of process measurement and control. **Recommended:** Reading Level 5 or 6. **Hours:** (27) 3 lect for 9 weeks. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

ELET B66a Electronic Communication Circuits (4 units) Basic principles of circuits used in electronic communications equipment, including oscillators, AF amplifiers, RF amplifiers, transmitters and modulation. **Prerequisite:** ELET B9 with a grade of "C." **Hours:** (108) 3 lect, 3 lab. **Offered:** F. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

ELET B66b Electronic Communication Systems (4 units)

Basic principles of electronic systems used in modern communication: AM receivers, FM receivers, television, antennas, broadcast stations and microwave. **Prerequisite:** ELET B66a. **Hours:** (108) 3 lect, 3 lab. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

ENVIRONMENTAL TECHNOLOGY

ENVT B1ab Introduction to Environmental Technology (3 units)

B1a-B1b (1.5-1.5) equivalent to B1ab

An introduction to the overall scope of Hazardous Materials Technology. Emphasizes legal definitions, terminology, and regulatory framework. Included is an historical background, career opportunities, governmental processes, and an overview of major hazardous materials handling and management procedures and requirements. **Prerequisite:** B1b: ENVT B1a. **Recommended:** B1a: Reading Level 5 or 6. **Hours:** (27-27) 3 lect/disc for 9 weeks. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B10 Safety and Emergency Response (1-1.5 units)

Modules designed to meet OSHA health and safety training requirements for hazardous materials and waste workers. ENVT B10a meets the 24-hour Hazardous Waste Worker Certification requirements. Three modules combined meet the 40-hour "hands on" certification requirements. Module "a" should be taken prior to "b" and "c." **Recommended:** ENVT B49/CHEM B49 or CHEM B15 and B16. **Hours:** (24-54) 1.5 to 3 lect/lab. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B10a Hazardous Materials Awareness and Safety (1 unit)

Health and safety aspects of working with hazardous materials. Emphasizes recognition of hazardous materials and the nature of worksite hazards. Included is a study of hazard classifications, laws and regulations applying to worker health and safety, types of health effects, personal protective equipment, risk reduction processes, and health and safety planning processes. Designed to meet general requirements of OSHA Hazardous Materials Training for work not requiring the use of respiratory protection. **Recommended:** ENVT B49/CHEM B49 or CHEM B15 and B16. **Hours:** (24) 3 lect for 8 weeks. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B10b Spill Control and Emergency Response (1.5 units)

Procedures for safety and emergency response to chemical spills in industrial and field setting. Focus on various spill control containment, and mitigation procedures, and development and implementation of a personal protective program pursuant to OSHA standards. **Recommended:** ENVT B49/CHEM B49 or CHEM B15 and B16. **Hours:** (45) 1.5 lect, 1.5 lab for 15 weeks. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B10c Decision Making in Emergencies (1.5 units)

Safety and emergency response to chemical and physical exposures in industrial and field settings. Focus on hazardous analysis and emergency response planning including: contingency and emergency plans; hazard identification; vulnerability analysis and risk evaluation; response functions, and incident command functions. **Recommended:** ENVT B49/ CHEM B49 or CHEM B15 and B16. **Hours:** (45) 1.5 lect, 1.5 lab for 15 weeks. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B15 Hazardous Materials Management Applications (1-1.5 units)

Modules designed to cover the requirements and applications of federal, state, and local laws and regulations relating to hazardous materials management. **Recommended:** ENVT B49/CHEM B49 or CHEM B15 and B16, ENVT B1, ENVT B30. **Hours:** (18-45) 3 lect or 3 lect/lab. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B15a Right to Know Laws (1.5 units)

Covers California and federal OSHA Hazard Communication Standards, Hazardous Material Emergency Planning and Community Right-to-Know regulations, and California's Safe Drinking Water & Toxic Enforcement Act. Emphasizes applications of these laws and regulations in the workplace, including proper labeling and handling of hazardous materials, obtaining MSDSs; and planning and reporting functions. **Recommended:** ENVT B1ab, ENVT B49/CHEM B49 or CHEM B15 and B16. **Hours:** (45) 1.5 lect, 1.5 lab for 15 weeks. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B15b Transportation and Storage of Hazardous Materials (1.5 units)

Focuses on California and Federal Transportation and Underground Tank regulations. Emphasizes applications of laws and regulations in the work of environmental technicians in industry, including proper completion of shipping papers; obtaining permits for operating, installing or closing underground tank facilities, and general planning and reporting functions. **Recommended:** ENVT B1ab, ENVT B49/CHEM B49 or CHEM B15 and B16. **Hours:** (45) 1.5 lect, 1.5 lab for 15 weeks. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B15c Air Quality Issues (1 unit)

Focuses on California federal, state and local air quality issues. Emphasizes applications of laws, regulations, and procedures in industry including, identification of toxic air pollutants, new source review and permitting, and general planning and reporting functions. **Recommended:** ENVT B1ab, ENVT B49/CHEM B49 or CHEM B15 and B16. **Hours:** (18) 3 lect for 6 weeks. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU and private colleges

ENVT B20 Hazardous Waste Generation, Reduction and Treatment (3 units)

The use of chemicals and materials in industrial processes and hazardous waste generation/reduction. Waste streams of seven selected industry categories will be covered. Examines applicable regulations and material balance concept of inventory. **Prerequisites:** CHEM B15 and B16 or ENVT B49. **Recommended:** Reading Level 5 or 6. **Hours:** (54) 3 lect. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B30 Health Effects of Hazardous Materials (3 units)

Acute and chronic health effects produced by exposure to chemical, physical, and biological agents. Emphasis is on hazardous materials commonly associated with industrial operations, waste disposal, and remediation sites. Topics include routes of entry, toxic effects, risk evaluation, permissible exposure limits, medical surveillance, control methods for reducing exposure, and understanding an MSDS. **Prerequisite:** BIOL B18 or equivalent. **Hours:** (54) 3 lect. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B40 Hazardous Waste Management Applications (1-1.5 units)

Modules designed to cover the requirements and applications of federal, state, and local laws and regulations relating to hazardous waste management. **Recommended:** ENVT B49/ CHEM B49 or CHEM B15 and B16, ENVT B1. **Hours:** (18-45) 3 lect or 3 lect/lab. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B40a Generator Requirements (1.5 units)

Requirements and applications of federal, state and local laws and regulations relating to hazardous waste management, including California and federal requirements for generators of hazardous waste. Emphasis on applications of laws and regulations applicable to industry including proper labeling, packaging, placarding, and manifesting of hazardous waste; storage requirements; permitting; and general planning and reporting functions. **Recommended:** ENVT B1ab; ENVT B49/CHEM B49, or CHEM B15 and B16. **Hours:** (45) 1.5 lect, 1.5 lab for 15 weeks. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU and private colleges

ENVT B40b Sampling and Analysis (1.5 units)

Requirements and applications of environmental sampling, methodology, equipment recognition and maintenance, calibration procedures, basic analytical techniques, and data interpretation. Selecting and working with analytical service laboratories, use and development of sampling plans, and performance of basic tests using typical field equipment will also be covered. **Recommended:** ENVT B1ab; ENVT B49/ CHEM B49, or CHEM B15 and B16. **Hours:** (45) 1.5 lect, 1.5 lab for 15 weeks. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU and private colleges

ENVT B40c Special Topics in Hazardous Waste Management (1 unit)

Requirements and applications of federal, state, and local laws and regulations relating to hazardous waste management as well as focus on California and federal requirements for special hazardous waste management areas. Emphasizes applications of laws and regulations including: overlapping agency jurisdictions; real estate transactions; infectious waste control; and household hazardous waste. **Recommended:** ENVT B1ab; ENVT B49/CHEM B49, or CHEM B15 and B16. **Hours:** (18) 3 lect for 6 weeks. **Repeat:** 1. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

ENVT B49 Applied Chemistry (4 units)

The systematic study of the principles of applied inorganic, organic, and biochemistry using a qualitative and quantitative approach. Topics include physical principles of chemistry; inorganic compounds and reactions; basic and applied nuclear chemistry, (including radioactivity, nuclear energy, uses of radioisotopes, radiation hazards); a survey of organic chemistry (classification, compounds, reactions, nomenclature); biochemistry (classification, composition, reactions in living organisms). The course emphasizes technical aspects of chemistry relating to everyday processes and industrial and environmental applications. Prerequisite: MATH BA or equivalent. Recommended: Reading Level 5 or 6. Hours: (108) 3 lect, 1 disc, 2 lab. Field trips may be required. CCS: Liberal Arts & Sciences. Transferable: CSU and private colleges. Note: Not open to students with credit in CHEM B49.

INDUSTRIAL DRAWING

Credit limitations may apply. For specific information see a counselor.

INDR B10 Introduction to Industrial Drawing and Graphics (1 unit)

Introductory course dealing with conventional drafting methods to obtain graphic solutions, design, modifications and delineations for industrial, architectural, engineering and interior drawings. Emphasizes basic drafting skills. **Recommended:** Reading Level 5 or 6. **Hours:** (36) 2 lect, 2 lab for 9 weeks. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

INDR B11 Introduction to Computer Aided Drafting and Design (CAD) (1 unit)

Introductory course utilizing a computer aided drafting and design (CAD) system to obtain graphic solutions, design refinements, modifications, and delineations for industrial, architectural, and engineering drawings. Emphasizes building skills necessary to function as a CAD operator in industry. **Recommended:** Reading Level 5 or 6. **Hours:** (36) 2 lect, 2 lab for 9 weeks. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

INDR B16 Introduction to 3D Animation (1 unit)

Introductory course utilizing 3D animation software and hardware to obtain photo realistic graphics for use in industrial and broadcast applications. Emphasizes building basic skills necessary to do these applications on an entry level. **Recommended:** INDR B11. **Hours:** (36) 2 lect, 2 lab for 9 weeks. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

INDR B20a Computer Aided Drafting and Design (CAD) (3 units)

An intensive study utilizing a computer aided drafting and design (CAD) system to obtain graphic solutions, design refinements, modifications, and delineations of industrial, architectural, and engineering drawings. Emphasizes basic high technology skills which are necessary to function as an entry-level CAD operator. **Prerequisites:** INDR B11, INDR B10 or equivalent experience to be evaluated by the instructor. **Recommended:** Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 lab. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

INDR B20b Computer Aided Drafting and Design (CAD) (3 units)

Continuation of the sequence to utilize the CAD system to obtain graphic solutions, design refinements, modifications, and delineations in working with industrial, architectural, and engineering drawings. Emphasizes basic high technology skills which are necessary to function as an entry-level CAD operator. **Prerequisite:** INDR B20a. **Hours:** (108) 2 lect, 4 lab. Field trips required. **Offered:** F. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

INDR B30b Industrial Drawing (3 units)

Fundamentals, techniques, procedures, and practices of industrial drafting and design based upon the American National Standard Drafting Manual of the American National Standards Institute, which includes lettering, basic theory of orthographic projection, freehand detail sketching, use of drafting instruments and equipment, solving multi-view problems, correct line use, sectioning, auxiliary views, pictorial sketching and drawing, revolutions, dimensioning practices, shop processes, fasteners, springs and threads, inking, graphs, and general drawing presentation. **Prerequisite:** INDR B10 with a minimum grade of "D" or two years of high school drafting with grades of "B." **Recommended:** Reading Level 5 or 6. **Hours:** (108) 2 lect, 4 lab. **Offered:** S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

INDR B37 Introduction to Geographic Information Systems (GIS) (3 units)

An introduction to methods of managing and processing spatial data. Covers the basic assumptions, concepts, theories, and structures of geographic information systems. Hands-on experience in data input, management, analysis, and display. **Recommended:** Minimum one year of high school algebra or MATH BA (may be taken concurrently). **Hours:** (108) 3 lect, 3 lab by arrangement. Field trips required. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges. **Note:** Not open to students who have taken the equivalent course, COMS B37.

INDR B50 Process Piping (3 units)

Develops knowledge of essential techniques of process piping drafting. Serves as a phase of training to become piping drafter. Includes piping plans, isometrics, orthographics, and process flow diagrams. **Prerequisite:** INDR B10. **Hours:** (108) 3 lect, 3 lab. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

INDR B51 Electrical Design I (2.5 units)

Introduces the student to the drawing and drafting techniques used in the preparation of electrical construction drawings in industry today. Emphasizes concepts of design to the student utilizing various national, state, and local rules and codes (e.g. 1987 National Electrical Code). **Prerequisites:** INDR B10 or two years of high school drafting with a grade of "B" or ELET B2. **Recommended:** Reading Level 5 or 6, INDR B11. **Hours:** (72) 2 lect, 2 lab. Field trips required. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

INDR B52 Geographic Information Systems (GIS) (3 units)

Modern Geographic Information Systems. Solving problems in either Land Information Systems, or Facilities Management Systems. Database management will also be emphasized. **Prerequisite:** INDR B20a. **Hours:** (108) 2 lect, 4 lab. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

INDR B55 Geometric Dimensioning and Tolerancing (1 unit)

An introductory course in the application and interpretation of geometric dimensioning and tolerancing concepts according to the latest revision of ANSI Y 14.5. This course is designed for persons working or preparing to work in the field of drafting, engineering, manufacturing, quality control and inspection. **Recommended:** Reading Level 5 or 6. **Hours:** (18) 1 lect. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

INDUSTRIAL TECHNOLOGY

Credit limitations may apply. For specific information see a counselor.

INDT B10 Introduction to Industrial Technology (0.5 unit)

Orientation to Bakersfield College and post-secondary education in California. Survey of various fields of industrial technology, career opportunities and requirements, development of a personal education plan. Satisfies the 0.5 unit educational planning requirement for graduation from Bakersfield College. **Recommended:** Reading Level 5 or 6. **Hours:** (9) 1 lect/disc for 9 weeks. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

INDT B50 Managing Quality Organizations (3 units)

Incorporates the systematic approach to constant improvement throughout an organization. Introduces themes, teams, tools/techniques of continuous quality improvement. Emphasizes the quality systems approach to: customer focus; and employee involvement in service, retail and manufacturing situations. **Hours:** (54) 3 lect. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only. **Note:** Not open to students have taken the equivalent course, MGMT B50.

INDT B90 Occupational Readiness (5 units)

Survival skills necessary for students to be successful in their occupational area. Units on communication, computation and technical skills emphasize the use of these skills in job related situations. Job survival skills include procedures and processes of securing a job, maintaining a job and work ethics. **Prerequisites:** Concurrent enrollment in either WELD B290 or AUTO B290. **Hours:** (180) 10 lect. Open entry/exit. **Offered:** F, S. **CCS:** Occupational Education. **Not Transferable:** Not degree applicable.

INDT B249ab Cooperative Work Experience Education (1-4 units. Limit 16 units)

See WEXP B249ab description.

TECHNICAL MATHEMATICS

TECM B52 Introduction to Technical Mathematics (3 units)

Fundamental concepts and mathematical processes, first degree equations, special products and factoring, fractions and fractional equations, ratios, proportions, radicals, exponents, graphs, simultaneous linear equations, quadratic equations. **Hours:** (90) 5 lect. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WATER TECHNOLOGY

WTRT B51 Basic Water Treatment (3 units)

Prepares the entrance level student for Water Facility Operator Certification, Grades 1 and 2 and/or to inform the interested public in the methodology used for the purification of domestic drinking water. **Hours:** (54) 3 lect. Field trips required. **Offered:** F. **CCS:** Occupational Education. **Not Transferable:** Not degree applicable.

WTRT B52 Basic Water Distribution (3 units)

Prepares the student to obtain Grade 1 certification from the American Water Works Association and/or to inform interested parties in the methods involved in accepted distribution systems and operations. **Hours:** (54) 3 lect. Field trips required. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Not degree applicable.

WTRT B53 Water and Wastewater Analysis (4 units)

Prepares the student for certification as a Water Quality Analyst, Grade 1. Lectures cover environmental influences, composition of natural water, analysis, interpretation of results and application to treatment problems. Laboratory experiments include those areas which are on the Grade 1 exam, and which are usually the controlling operating tests for water and wastewater treatment plants. **Recommended:** High School CHEM or job related experience, Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 lab. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Not degree applicable.

WELDING

WELD B1a-B1b Introduction to the Welding Processes (1.5-1.5 units)

Properties and characteristics of metals and a survey of metal welding processes. Safety, theory, and practical experience in oxy-acetylene welding and cutting, shielded metal arc, PAC, MIG, TIG, submerged ARC, resistance welding and joint design, codes and weld testing. **Recommended:** Reading Level 5 or 6. **Hours:** (54-54) 1 lect, 2 lab. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

WELD B53a-B53b Shielded Metal Arc Welding (1.5-1.5 units)

Basic arc welding theory and manipulative skills related to the shielded metal arc welding process, including welding in all positions with various electrodes. **Recommended:** Reading Level 5 or 6. **Hours:** (54-54) 1 lect, 2 lab. **Offered:** F, S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WELD B54a Blueprint Reading for Welders and Machinists (3 units)

Principles of blueprint reading as applied to the welding and machine trades. Emphasis will be placed on the ability to visualize and interpret working drawings. Welding symbols and basic shop math are also included. **Recommended:** Reading Level 5 or 6. **Hours:** (54) 3 lect. **Offered:** F. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WELD B54b Template Development and Layout for the Welder (3 units)

Technical skills and critical thinking in layout techniques including layout situations, mathematical and pipe fitting terminology used in the industry. **Prerequisite**: WELD B54a with a grade of "C" or evaluation by instructor of student's equivalent experience. **Recommended:** Reading Level 5 or 6. **Hours:** (54) 3 lect. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WELD B55a-B55b Structural Plate Certification (1.5-1.5 units)

Safety, introduction to welding codes, welding discontinuities and practical welding. Experience on plate with shielded metal arc welding, based on the American Welding Society DI.1 structural code. **Recommended:** WELD B53b or three years work experience as a welder. **Hours:** (54-54) 1 lect, 2 lab. **Offered:** F, S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WELD B55c-B55d ASME Pipe Certification (1.5-1.5 units)

Weld, safety, welding pipe in the 1G, 2G and 5G positions. An examination of the ASME Welding Code will also be covered. **Prerequisites:** WELD B55a with a grade of "C." **Recommended:** Reading Level 5 or 6. **Hours:** (54-54) 1 lect, 2 lab. **Offered:** F, S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WELD B55e-B55f API and Related Certification Testing (1.5-1.5 units)

Welding safety, and welding pipe in the 6G position, pipe layout and the API 1104 pipe welding code will also be covered. **Prerequisites:** WELD B55c-B55d with a grade of "C." **Recommended:** Reading Level 5 or 6. **Hours:** (54-54) 1 lect, 2 lab. **Offered:** F, S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WELD B74a-B74b TIG and MIG Welding (1.5-1.5 units)

Theory and application of TIG, MIG, Fluxcore, and Submerged welding processes. Emphasizes safe and proper operation of these welding processes while welding on mild steel, aluminum, and stainless steel. **Recommended:** WELD B1a or WELD B53a or one year work experience as a welder. **Hours:** (54-54) 1 lect, 2 lab. **Offered:** F. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WELD B90 General Welding (12 units)

Entry-level welding skill development in modern welding and cutting processes, theory and practice. **Prerequisites:** Concurrent enrollment in INDT B290. **Hours:** (450) 6 lect, 19 lab. **Offered:** F, S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WOOD

WOOD B1 Creative Woodworking (3 units)

Basic woodworking processes and materials, use and care of hand tools, limited machine use, wood finishing, lathe turning, bent lamination, and hand carving. **Recommended:** Reading Level 5 or 6. **Hours:** (108) 2 lect, 4 lab. **Offered:** F. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

WOOD B2 Furniture and Cabinetmaking (3 units)

Skill development on the use and care of portable and stationary woodworking machines. The use of basic wood joint techniques, surface preparation, gluing, clamping and assembly is emphasized. **Recommended:** Reading Level 5 or 6. **Hours:** (108) 2 lect, 4 lab. **Offered:** F, S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

WOOD B5 Intermediate Cabinetmaking (3 units)

Machine woodworking for students with prior basic knowledge of woodworking machines and basic construction and assembly techniques. Emphasizes cabinet construction for industry, styles and designs, materials and handling, and basic estimating skills. **Prerequisite:** WOOD B2 or evaluation by instructor. **Recommended:** Reading Level 5 or 6. **Hours:** (108) 2 lect, 4 lab. Field trips required. **Offered:** S. **CCS:** Occupational Education. **Transferable:** CSU Fresno.

WOOD B65a Advanced Cabinetmaking (3 units)

Machine woodworking emphasizing new designs including modular as well as European cabinet construction, new materials and processes, Kortron, malamine, high density particle board, as well as others. Advanced bidding techniques are discussed. **Prerequisite:** WOOD B5 or evaluation by instructor. **Hours:** (108) 2 lect, 4 lab. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

WOOD B65b Advanced Cabinetmaking (3 units)

Machine and hand techniques necessary for top-end construction emphasized. Non-residential type cabinets studied. Economical use of solid lumbers will be shown. Architecture millwork such as frame and panel wainscoat, bookcases, desks, bars, doors, skylights and windows demonstrated. Also included are commercial applications such as store fixtures, counters and reception desks. **Prerequisite:** WOOD B65a or evaluation by instructor. **Hours:** (108) 2 lect, 4 lab. Field trips required. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.