

Course Descriptions

AIR CONDITIONING AND REFRIGERATION (ACR)

- ACR 111 REFRIGERATION PRINCIPLES (2T, 4M) 3 credits**
 This course emphasizes the fundamental principles for air conditioning and refrigeration. Instruction is provided in the theory and principles of refrigeration heat transfer, refrigeration system components, the mechanical cycle of operation, and refrigeration characteristics. Upon completion, students should understand the functions of major systems components, terminology, heat transfer, safety, and the use and care of tools and equipment.
- ACR 112 HVACR SERVICE PROCEDURES (1T, 5M) 3 credits**
 This course covers system performance checks and refrigerant cycle diagnosis. Emphasis is placed on the use of refrigerant recovery/recycle units, industry codes, refrigerant coils and correct methods of charging and recovering refrigerants. Upon completion, students should be able to properly recover/recycle refrigerants and demonstrate safe, correct service procedures which comply with the no-venting laws.
- ACR 113 REFRIGERATION PIPING PRACTICES (1T, 2E, 3M) 3 credits**
 This course introduces students to the proper installation procedures of refrigerant piping and tubing for the heating, ventilation, air conditioning and refrigeration industry. This course includes various methods of working with and joining tubing. Upon completion, students should understand related terminology, be able to identify ACR pipe and tubing, and various fittings.
- ACR 115 HEATING SYSTEMS I (2T, 4E, 6M) 6 credits**
 This course covers the fundamentals of heating systems. Emphasis is placed on components operations, general service procedures, and basic installation procedures. Upon completion, students should be able to install and service gas and electric furnaces.
- ACR 121 PRINCIPLES OF ELECTRICITY FOR HVACR (2T, 4M) 3 credits**
 This course is designed to provide the student with the basic knowledge of electrical theory and circuitry as it pertains to air conditioning and refrigeration. This course emphasizes safety, definitions, symbols, laws, circuits, and electrical test instruments. Upon completion, students should understand and be able to apply the basic principles of HVACR circuits and circuit components.
- ACR 122 HVACR ELECTRICAL CIRCUITS (1T, 5M) 3 credits**
 This course introduces the student to electrical circuits and diagrams. Electrical symbols and basic wiring diagrams are constructed in this course. Upon completion, students should understand standard wiring diagrams and symbols.

- ACR 123 HVACR ELECTRICAL COMPONENTS (1T, 5M) 3 credits**
PREREQUISITE: ACR 121
 This course introduces students to electrical components and controls. Emphasis is placed on the operations of motors, relays, contractors, starters, and other HVAC controls. Upon completion, students should be able to understand motor theory and control functions in HVACR equipment.
- ACR 125 ADVANCED HEAT PUMP SYSTEMS (2T, 4E, 6M) 6 credits**
PREREQUISITE: ACR 123
 This course is an in-depth study of the theory and application of heat pump systems. Topics include reverse cycle refrigeration, four-way valve operation, industry codes, system components and troubleshooting. Upon completion, students should be able to install and service heat pumps.
- ACR 126 COMMERCIAL HEATING SYSTEMS (1T, 5M) 3 credits**
PREREQUISITE: ACR 115
 This course covers the theory and application of larger heating systems. Emphasis is placed on larger heating systems associated with commercial applications such as gas heaters, boilers, unit heaters, and duct heaters. Upon completion, students should be able to troubleshoot and perform general maintenance on commercial heating systems.
- ACR 130 COMPUTER ASSISTED HVAC TROUBLESHOOTING (2E, 3M) 1 credit**
 This course focuses on troubleshooting procedures. Emphasis is placed on the proper use of test equipment and machine/electrical malfunctions. Upon completion, students should be able to diagnose and repair service problems in HVAC equipment.
- ACR 132 RESIDENTIAL AIR CONDITIONING (1T, 5M) 3 credits**
PREREQUISITE: ACR 111
 This course introduces students to residential air conditioning systems. Emphasis is placed on the operation, service, and repair of residential air conditioning systems. Upon completion, students should be able to service and repair residential air conditioning systems.
- ACR 133 DOMESTIC REFRIGERATION (1T, 2E, 3M) 3 credits**
PREREQUISITE: ACR 111
 This course covers domestic refrigerators and freezers. Emphasis is placed on operation, maintenance, and repair of domestic refrigerators. Upon completion, students should be able to service and repair home refrigerators and freezers. **(Taught on Demand)**
- ACR 134 ICE MACHINES (1T, 2E, 3M) 3 credits**
 This course introduces students to commercial ice machines. Emphasis is placed on components, electrical and mechanical operation sequences, control adjustment procedures, preventive maintenance, repairs, and

installation procedures. Upon completion, students should be able to install, service and repair commercial ice machines. **(Taught on Demand)**

ACR 139 AUTOMOTIVE AIR CONDITIONING (1T, 2E, 3M) 3 credits
This course introduces students to the fundamentals of the automotive air conditioning systems. Emphasis is placed on service, diagnostics, repair procedures and the recovery and recycling of refrigerants. Upon completion, students should be able to service and repair automotive air conditioning systems.

ACR 144 BASIC DRAWING AND BLUEPRINT READING IN HVAC (3T) 3 credits
This course covers basic drawing and blueprint reading as applied to the HVAC industry. Emphasis is on three-view drawings, basic duct systems, and isometric piping. Upon course completion, students should be able to perform basic drawings related to HVAC systems and read pertinent blueprints. **(Taught on Demand)**

ACR 147 REFRIGERATION TRANSITION AND RECOVERY (3T) 3 credits
This course is EPA-approved and covers material relating to the requirements necessary for types I, II, III and universal certification. The EPA certification exam is administered at the end of the course. Upon completion, students should be able to pass the EPA refrigerant certification exam. **(Taught on Demand)**

ACR 192 HVAC APPRENTICESHIP/INTERNSHIP (15M) 3 credits
This course is designed to provide basic hands-on experiences in the workplace. The student is provided with a training plan developed by the employer and instructor working together to guide the learning experience. Upon course completion, students should be able to work independently and apply related skills and knowledge. **(Taught on Demand)**

ACR 200 REVIEW FOR CONTRACTORS EXAM (1T, 5M) 3 credits
This course prepares students to take the State Certification Examination. Emphasis is placed on all pertinent codes, piping procedures, duct design, load calculation, psychometrics, installation procedures, and air distribution. Upon completion, students should be prepared to take the contractors exam. **(Taught on Demand)**

ACR 202 SPECIAL REFRIGERATION SYSTEMS (1T, 2E, 3M) 3 credits
PREREQUISITE: ACR 111
This course is designed to give students the basic knowledge of a variety of commercial refrigeration systems. Topics include expandable refrigeration evaporator systems, combination spray and compressor systems, open cycle ammonia, CO2 pellets, vortex tubes, reach in coolers, and soft serve ice cream machines. Upon completion, students should be able to perform general troubleshooting and maintenance on various commercial refrigeration systems.

ACR 203 COMMERCIAL REFRIGERATION (1T, 2E, 3M) 3 credits
PREREQUISITE: ACR 111
This course focuses on commercial refrigeration systems. Emphasis is placed on evaporators, condensers, compressors, expansion devices, special refrigeration components and application of refrigeration systems. Upon completion, students should be able to service and repair commercial refrigeration systems.

ACR 204 COMMERCIAL AIR CONDITIONING (1T, 5M) 3 credits
PREREQUISITE: ACR 111
This course focuses on commercial air conditioning systems. Topics include maintenance, repair, and troubleshooting. Upon course completion, students should be able to service and repair commercial air conditioning systems.

ACR 205 SYSTEM SIZING AND AIR DISTRIBUTION (1T, 5M) 3 credits
This course provides instruction in the load calculation of a structure and system sizing. Topics of instruction include heat loss, heat gain, equipment and air distribution sizing, and factors making acceptable indoor air quality. Upon course completion, students should be able to calculate system requirements.

ACR 206 SYSTEM TROUBLESHOOTING (2T, 4M) 3 credits
This course introduces students to various HVAC troubleshooting techniques. Emphasis is placed on mechanical and electrical problems, heat pump service, air conditioning service, and problem analysis. Upon course completion, students should be able to perform various troubleshooting techniques on heating and air conditioning systems.



Course Descriptions

ADVANCED ELECTRONICS MANUFACTURING (AEM)

AEM 100 INTRODUCTION TO ELECTRONICS MANUFACTURING (2T, 3M) 3 credits

This course is an introduction to electronics manufacturing and covers basic electricity concepts, through-hole and surface mount component identification, electrostatic discharge, materials and processes, including a basic overview of through-hole and surface mount soldering, manual cleaning, visual inspection and basic work techniques. An IPC J-STD-001 Operator Certification is included as part of this course. Successful completion of the certification testing is not a requirement for receiving credit for this class.

AEM 105 FUNDAMENTALS OF ELECTRONICS MANUFACTURING (2T, 3M) 3 credits
PREREQUISITE: AEM 100

This is a fundamentals of electronics manufacturing course that covers printed circuit board (PCB) layout and design for manufacturability, printed circuit board manufacturing, solder paste and other materials, PCB fabrication, solder paste printing, component placement, reflow soldering and wave soldering, automated cleaning, automated inspection, in-circuit and functional test and conformal coating. An IPC-A-600 and IPC-A-610 Worker Proficiency Certification is included as part of this course. Successful completion of the certification testing is not a requirement for receiving credit for this class.

AEM 150 FUNDAMENTALS OF CABLE/HARNESS ASSEMBLY (2T, 3M) 3 credits

This is a cable/harness assembly course that covers materials and wire configurations, tools for wire preparation and assembly, stripping of insulation from conductors and cables, and general connection requirements such as marking and labeling, terminal assembly, solder connections, crimp connections, solder splices, shield terminations, tying and lacing, cable/harness protective coverings, hardware installation, solderless wrap, acceptability requirements, and testing. Industry specification/standards covered during this course will be IPC/WHMA-A-620 Requirements for Acceptance for Cable and Wire Harness Assemblies. An IPC Worker Proficiency Certification to IPC/WHMA-A-620 is included as part of this course. Successful completion of the certification testing is not a requirement for receiving credit for this class.

AEM 160 PRINCIPLES OF ELECTRONICS MANUFACTURING I (3T, 3M) 4 credits
PREREQUISITE: AEM 105, MTH 113, ARS 202
COREQUISITE: PMC 180, ARS 104

This course covers the manufacture and assembly of electronic printed circuit boards, from component selection and board layout to soldering and testing. Special emphasis on high-volume manufacturing techniques and state-of-the-art processes, such as surface mount technology (SMT) will be covered. Laboratory projects include CAD circuit board layout, using automatic placement and soldering equipment, investigating thermal

characteristics of circuit boards, process design and evaluation using SPC techniques and rework and repair.

AEM 170 PRINCIPLES OF ELECTRONICS MANUFACTURING II (3T, 3M) 4 credits
PREREQUISITE: AEM 160

This is a Principles of Electronics Manufacturing course that covers advanced packaging technologies. Topics include BGA, Flip Chip, Multi-chip module, and Chip Scale Packaging. Interconnect reliability, handling procedures, process requirements and yields for assembly, cleaning, automated inspection and testing will also be covered.

AEM 190 OPTOELECTRONICS (3T) 3 credits
COREQUISITE: AEM 191

This course covers Optoelectronic packaging technologies including active and passive components and discrete fiber cable, their characteristics, and the manner that these parts will become an integral part of the functioning module, board or sub-assembly. Topics will include technology choices, design considerations, material properties, component mounting and interconnecting structures, assembly processes, testing, application, rework and reliability of completed optoelectronic assemblies. The industry specification/standards that will be covered during this course will be J-STD-040 Optoelectronics Assembly and Packaging Technology.

AEM 191 OPTOELECTRONICS LAB (3M) 1 credit
COREQUISITE: AEM 190

This is a companion course to AEM 190. Following all safety procedures, students will successfully terminate a variety of fiber optic connectors as well as perform mechanical and fusion splicing that meets the Electronics Technicians Association (ETA) and the Telecommunications Industry Association and Electronics Industry Alliance (TIA/EIA) standards. Additionally, students will be trained to fully test and troubleshoot fiber optic cables and fiber optic systems using a Visual Fault Finder (VFF), fiber optic light source and power meter and an Optical Time Domain Reflectometer (OTDR). Students will test and troubleshoot pre-faulted Local Area Network (LAN) links and properly identify all system faults.

AEM 200 PROJECTS IN ELECTRONICS MANUFACTURING (2T, 6M) 4 credits
PREREQUISITE: AEM 170, AEM 190
COREQUISITE: EET 281

This is a capstone course in electronics manufacturing. Students will be given a printed circuit board to layout and assemble using high volume manufacturing techniques and state-of-the-art processes. They will develop test strategies and implement statistical process control in order to validate process design. At the end of the course, each student will present written and oral reports on his or her part of the project. Students will evaluate each step of the manufacturing process.

AEROSPACE TECHNOLOGY (ARS)

ARS 100 PRINT READING, GEOMETRIC DIMENSIONING AND TOLERANCING AND PRECISION MEASUREMENT (3T) 3 credits
COREQUISITE: ARS 102
 This course is designed to introduce the basic principles of print reading, interpretation, and design including the English and Metric Systems; precision measuring equipment; and geometric dimensioning and tolerancing based on industry standards. (This course should be taken during the first or second semester of enrollment in the program.)

ARS 101 FUNDAMENTALS OF AEROSPACE MANUFACTURING (3T) 3 credits
COREQUISITE: ARS 102
 This course provides an overview of the materials and processes used in manufacturing high performance, light weight, and reliable structures for aerospace products. Emphasis is placed on process evaluation techniques that can be extrapolated to other system areas such as new products and new technology. (This course should be taken during the first or second semester of enrollment in the program.)

ARS 102 INTRODUCTION TO AEROSPACE TECHNOLOGY (1T) 1 credit
 The purpose of this program is to provide students with a foundation of knowledge and technically oriented experience in the study of Aerospace Technologies, its effects upon their lives, and the choosing of an occupation. The content and activities include the study of safety in the manufacturing environment and stresses the understanding and demonstration of the technological tools, machines, instruments, materials, quality, processes, and systems in business and industry. (This course should be taken during the first semester of enrollment in the program.)

ARS 104 SAFETY IN A MANUFACTURING ENVIRONMENT (3T) 3 credits
COREQUISITE: ARS 102
 This course is an introduction to general issues, concepts, procedures, hazards, and safety standards found in an aerospace industrial environment. This safety course is to make technicians aware of safety issues associated with their changing work environment and attempt to eliminate industrial accidents. (This course should be taken during the first or second semester of enrollment in the program.)

ARS 126 MACHINING FUNDAMENTALS (1T, 6M) 3 credits
PREREQUISITE: ARS 100, ARS 101, ARS 104
 This course is an introduction to general machining issues, concepts, procedures, and safety standards found in an industrial environment. The technician is introduced to basic manual as well as introductory level computerized-numeric-control (CNC) programming and CNC manufacturing skills. Topics include benchwork, speeds and feeds, tooling applications, set-up, machine control

ARS 127 ADVANCED MACHINING (2T, 2E) 3 credits
PREREQUISITE: ARS 126
 This is an advanced course covering general machining issues, concepts, and procedures; basic preventive maintenance; and safety standards found in an aerospace industrial environment. The course is designed to supply the aerospace technician with skills needed to perform basic computerized-numeric-control (CNC) machining using intermediate CNC programming skills, bending, and brake forming operations in an aerospace facility.

ARS 128 CNC PROGRAMMING (2T, 2E) 3 credits
PREREQUISITE: ARS 127
 This course covers intermediate computerized-numeric-control (CNC) programming, intermediate computer-aided drafting/computer-aided manufacturing (CAD/CAM) programming, and preventive maintenance. Programming topics include sketching; solid modeling; 3-axes milling; CNC lathe programming; tool path and cutter compensations; and reading, writing, and using G & M code programming language (preparatory and miscellaneous commands) to complete intermediate-level machining projects.

ARS 151 WELDING PRINCIPLES, THEORY AND SYMBOLS (1T, 6M) 3 credits
PREREQUISITE: ARS 100, ARS 101, ARS 104
 This is a theory and skill-based course in basic welding (gas and arc), plasma arc, brazing, soldering, and cutting processes used in maintenance and manufacturing. Other theory topics include forge, submerged arc, electroslog, stud arc, resistance, ultrasonic, electron beam, and laser beam welding. Students use welding symbols, joint designs, and weld positions to prepare specimens. The course also covers terminology, standards for welding acceptable and unacceptable welds, safety, and qualification tests.

ARS 152 ORBITAL TUBE WELDING (2T, 3M) 3 credits
PREREQUISITE: ARS 100, ARS 101, ARS 104
 This course is a study in programmable orbital tube welding setup methods, programming methods, and safe operation of welders and tube preparation machinery. The course covers the application of automated gas tungsten arc welding (GTAW) on small thin-walled tubing.

ARS 153 GAS TUNGSTEN ARC AND PLASMA ARC WELDING (2T, 2E) 3 credits
PREREQUISITE: ARS 151
 This course describes processes, methods, and skills required to produce acceptable welds with gas tungsten arc welding (GTAW) and plasma arc welding (PAW) equipment for aerospace hardware; the standard of acceptability is AWS D17.1:2001 (or latest revision). Topics include equipment, tooling, shielding gases, arc characteristics, welding techniques, non-consumable

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	electrodes, filler metals, base materials, and related safety. Instruction covers manual, semi-automatic, and automatic welding procedures.	ARS 229	INSPECTION AND TEST (2T, 2E) 3 credits PREREQUISITE: ARS 100, ARS 101, ARS 104 This course is an advanced class covering inspection processes, concepts, procedures, and safety standards found in an aerospace industrial inspection environment. Inspection topics emphasized are vernier and micrometer instruments, gage blocks, indicators, calibration procedures, coordinate measuring machines, theodolite and laser alignment equipment, ultrasonic testers, destructive and non-destructive test procedures, and failure analysis procedures.
ARS 176	ELECTRICAL/ELECTRONIC ASSEMBLY (2T, 3M) 3 credits This mechanics of electrical/electronics assembly course covers materials and wire configurations, tools for wire preparation and assembly, wire stripping, connection requirements, terminal assembly, solder connections, crimp connections, solder splices, shield terminations, tying and lacing, hardware installation, inspection, testing, safety, and industry specifications/standards. Worker proficiency certification in IPC/WHMA-A-620, "Requirements for Acceptance for Cable and Wire Harness Assemblies," is covered but certification testing is not a requirement to receive credit for the class.	ARS 251	SPECIALIZED WELDING PROCESSES (3T) 3 credits PREREQUISITE: ARS 153 This course is an overview of the basics of metals joining using processes other than electric arc. Topics include safety; brazing; soldering; diffusion bonding; and welding processes such as resistance, laser, electron beam, ultrasonic, friction, inertia, explosion, upset, thermite, and forge.
ARS 178	AEROSPACE MECHANICAL ASSEMBLY (2T, 2E) 3 credits PREREQUISITE: ARS 100, ARS 101, ARS 104 This course is a study of mechanical assembly processes applied in aerospace and related manufacturing industries. Topics include drilling techniques, torquing techniques, fastener installation, related attachments, and safety.	ARS 253	WELDING CERTIFICATION PREPARATION (1T, 4E) 3 credits COREQUISITE: ARS 251 This course details the requirements for welder/welding operator certification in the aerospace industry. Training includes gas tungsten arc welding (GTAW) and plasma arc welding (PAW) processes and equipment and related safety. Emphasis is on materials in Groups I, II, III, and IV as defined in AWS D17.1:2001.
ARS 202	PROCESS CONTROL AND QUALITY MANAGEMENT (3T) 3 credits PREREQUISITE: MTH 103 OR MTH 112 OR MTH 118 This course provides the student with a basic understanding of quality assurance including the history of the quality movement in the United States; national and international standards for quality management systems; the impact of quality on an organization's performance; group problem solving; and statistical methods such as statistical process control (SPC); process capability studies; and the concepts associated with lean manufacturing.	ARS 276	INSTRUMENTATION ATTACHMENTS AND ADHESIVE BONDING PROCEDURES (2T, 2E) 3 credits PREREQUISITE: ARS 100, ARS 104 This course covers the use and installation techniques of instruments such as thermocouples, temperature sensors, and strain gages on different types of aircraft and structures. Topics include bonding materials, soldering techniques, electrical testing of temperature sensors and strain gages, mixing and applying adhesives for pressure, the effects of corrosion and weather, fuel tank sealing, adhesive selection, and safety.
ARS 227	SKIN FORMING AND HEMI MILLING (2T, 2E) 3 credits PREREQUISITE: ARS 128 This course covers advanced skills needed to perform computerized-numeric-control (CNC) milling and machining processes, hemi milling operations, and bending and forming functions. The technician is introduced to advanced CNC programming, CNC operational and manufacturing skills, and brake forming operations including bump forming. Related safety and basic preventive maintenance techniques are covered.	ARS 278	COMPOSITE MATERIALS FABRICATION AND ASSEMBLY (2T, 2E) 3 credits PREREQUISITE: ARS 178 This is a course in composite materials manufacturing. Topics include design and manufacturing techniques such as wet layups, prepregs, vacuum bagging, and filament winding. The course also covers the history of composite manufacturing, types of materials used in composite manufacturing, fabrication, drilling and repair techniques, and related safety.
ARS 228	VERTICAL TURRET LATHES (2T, 2E) 3 credits PREREQUISITE: ARS 128 This advanced course covers an introduction to vertical turret lathe operations; machining issues, concepts, and procedures; basic preventive maintenance; and safety standards. Topics include lathe tooling, chucking and fixturing, computerized-numeric-control (CNC) lathe programming, turning and threading operations, boring and facing, and manipulation of Fanuc machine controls.	ARS 280	SURFACE PREPARATION AND COATINGS (2T, 2E) 3 credits PREREQUISITE: ARS 101, ARS 104 This course is a study of component surface preparation for various coating and painting applications. The content includes color development, paint booth opera-

tion (electrical and air system), wet and dry coating thickness measurement, manual and automated coating techniques, and general and hazardous material handling safety.

ARS 284 SPECIALIZED COATING PROCESSES (2T, 2E) 3 credits
PREREQUISITE: ARS 280
This course is a study in special coatings for aerospace structures. Topics include mixing, applying, and curing of coating materials, environmental effects on coating materials, and general and hazardous material handling safety. The course also covers equipment used in these processes.

ANTHROPOLOGY (ANT)

ANT 200 INTRODUCTION TO ANTHROPOLOGY (3T) 3 credits
This course is a survey of physical, social, and cultural development and behavior of human beings.

ANT 210 PHYSICAL ANTHROPOLOGY (3T) 3 credits
This course is a study of the human evolution based upon fossil and archaeological records as well as analysis of the variation and distribution of contemporary human populations.

ANT 220 CULTURAL ANTHROPOLOGY (3T) 3 credits
This course is the application of the concept of culture to the study of both primitive and modern society.

ANT 226 CULTURE AND PERSONALITY (3T) 3 credits
PREREQUISITE: ANT 200
This course explores the relationship between personality development and culture from a cross cultural perspective.

ANT 230 INTRODUCTION TO ARCHAEOLOGY (3T) 3 credits
This course is an introduction to archaeological excavation techniques and post-excavation laboratory procedures.

ANT 236 FIELD SURVEY IN ARCHAEOLOGY (6E) 3 credits
PREREQUISITE: ANT 230
This course permits students to apply archaeological techniques to field research projects.

ANT 237 ARCHAEOLOGICAL LAB PROCEDURES (6E) 3 credits
PREREQUISITE: ANT 230
This course specializes in artifact conservation, cataloging, sorting, storage, and general post-excavation cultural material administration. Learning methodology and understanding the deterioration-susceptibility of objects.

ANT 246 PRESERVATION LAB PROCEDURES (6E) 3 credits
PREREQUISITE: ANT 230
This course is primarily intended for students interested in pursuing museum science and archaeological labo-

ratory procedures. It reviews technical information on curation, preservation, and conservation of physical and cultural objects.

ANT 260 INDIANS OF NORTH AMERICA (3T) 3 credits
This course surveys the history, development, and culture of North American Indian tribes.

ART (ART)

ART 100 ART APPRECIATION (3T) 3 credits
This course is designed to help the student find personal meaning in works of art and develop a better understanding of the nature and validity of art. Emphasis is on the diversity of form and content in original artwork. Upon completion, students should understand the fundamentals of art, the materials used and have a basic overview of the history of art.

ART 101 ART WORKSHOP I (6E) 3 credits
PREREQUISITE: Permission of instructor
This course provides an art experience for both non-art and art majors who are interested in a variety of art projects concerned with community or college related activities. Emphasis is placed on the organization of ideas in advancing their creative process. Upon completion, students should be able to present visual evidence of the activities involved and explain how the experience advanced their artistic skills.

ART 102 ART WORKSHOP II (6E) 3 credits
PREREQUISITE: Art Workshop I, Permission of instructor
This course provides an art experience for both non-art and art majors who are interested in a variety of art projects concerned with community or college related activities. Emphasis is placed on the organization of ideas in advancing their creative process. Upon completion, students should be able to present visual evidence of the activities involved and explain how the experience advanced their artistic skills.

ART 109 ART MUSEUM SURVEY (3T) 3 credits
This course covers the art experience through supervised visits to museums and art galleries. Emphasis is placed on learning through critical study. Upon completion, students should be able to write a critical analysis of the artwork experienced that demonstrates an understanding of aesthetics.

ART 113 DRAWING I (6E) 3 credits
This course provides the opportunity to develop perceptual and technical skills in a variety of media. Emphasis is placed on communication through experimenting with composition, subject matter and technique. Upon completion, students should demonstrate and apply the fundamentals of art to various creative-drawing projects.

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ART 114	<p>DRAWING II (6E) 3 credits PREREQUISITE: ART 113 This course advances the student's drawing skills in various art media. Emphasis is placed on communication through experimentation, composition, technique and personal expression. Upon completion, students should demonstrate creative drawing skills, the application of the fundamentals of art, and the communication of personal thoughts and feelings.</p>	ART 134	<p>CERAMICS II (6E) 3 credits PREREQUISITE: ART 133 This course develops the methods of clay forming as a means of expression. Topics may include hand building, glazing, design, and the functional and aesthetic aspects of pottery, although emphasis will be placed on the wheel throwing method. Upon completion, students should demonstrate improved craftsmanship and aesthetic quality in the production of pottery.</p>
ART 121	<p>TWO-DIMENSIONAL COMPOSITION I (6E) 3 credits This course introduces the basic concepts of two-dimensional design. Topics include the elements and principles of design with emphasis on the arrangements and relationships among them. Upon completion, students should demonstrate an effective use of these elements and principles of design in creating two-dimensional compositions.</p>	ART 173	<p>PHOTOGRAPHY I (6E) 3 credits This course is an introduction to the art of photography. Emphasis is placed on the technical and aesthetic aspects of photography with detailed instruction in dark-room techniques. Upon completion, students should understand the camera as a creative tool, understand the films, chemicals and papers, and have a knowledge of composition and history.</p>
ART 122	<p>TWO-DIMENSIONAL COMPOSITION II (6E) 3 credits PREREQUISITE: ART 121 This course covers the theory and practice of composing two-dimensional images. Emphasis is placed on the relation between the basic elements and principles of design and their impact on the visual message. Upon completion, students should, through personal expression, demonstrate an effective use of these elements and principles of design in creating two-dimensional compositions.</p>	ART 174	<p>PHOTOGRAPHY II (2T, 2E) 3 credits PREREQUISITE: Permission of instructor This is a sequence to Photography I and serves as an introductory photography course. Emphasis is placed on aesthetic as well as technical aspects of photography. Upon completion, the student will be able to produce well composed photographs.</p>
ART 126	<p>COLOR (6E) 3 credits This course introduces the student to fundamentals of color and color uses. Topics include various color theories, technical skills in mixing color, types of pigment and the expressive uses of color. Upon completion, students should be able to explain and demonstrate a fundamental understanding of color as it is used in the development of assigned color problems.</p>	ART 176	<p>FILMMAKING (6E) 3 credits This course provides a knowledge of the basics of filmmaking. Emphasis is placed on procedure, equipment, editing and sound. Upon completion, students should demonstrate a basic knowledge of filmmaking through critical analysis and film projects.</p>
ART 127	<p>THREE-DIMENSIONAL COMPOSITION (6E) 3 credits PREREQUISITE: ART 113 or ART 121 This course introduces art materials and principles of design that acquaint the beginner with the fundamentals of three-dimensional art. Emphasis is placed on the use of art fundamentals and the creative exploration of materials in constructing three-dimensional artworks. Upon completion, students should demonstrate basic technical skills and a personal awareness of the creative potential inherent in three-dimensional art forms.</p>	ART 177	<p>COLOR PHOTOGRAPHY (2T, 2E) 3 credits PREREQUISITE: ART 173 or ART 176 or Permission of instructor This course covers the primary materials and processes of color photography. Emphasis is placed on the correct exposure, processing, creative color usage, and printing of both positive/negative color materials through exploration of films, filters, processes, and color temperature. Upon completion, students should be able to correctly execute the technical controls of color materials and explore the creative possibilities of color photography.</p>
ART 133	<p>CERAMICS I (6E) 3 credits This course introduces methods of clay forming as a means of expression. Topics may include hand building, wheel throwing, glazing, construction, design, and the functional and aesthetic aspects of pottery. Upon completion, students should demonstrate through their work a knowledge of their methods, as well as an understanding of the craftsmanship and aesthetics involved in ceramics.</p>	ART 178	<p>AUDIO-VISUAL TECHNIQUES (1T, 2E) 2 credits This course is an exploration of the area of linkage between the visual and auditory senses. Work with sound and recording equipment, projected images and multimedia hardware and software is included. Students will produce finished multimedia pieces.</p>
		ART 187	<p>PHOTOGRAPHY, FILM, AND MEDIA I (1T, 2E) 2 credits PREREQUISITE: ART 173 or PFC 177 or Permission of instructor This course is designed to help the student explore creative approaches to photography, film, and related media. Problems in darkroom techniques, laboratory techniques, and special effects are included. Upon completion, the student should be able to apply these techniques to pro-</p>

professional quality finished pieces.

ART 188 PHOTOGRAPHY, FILM, AND MEDIA II (1T, 2E) 2 credits
PREREQUISITE: PFC 187 or Permission of instructor
 This course is designed to help the student explore creative approaches to photography, film, and related media in greater depth. Problems in darkroom techniques, laboratory techniques, and special effects are included. Upon completion, the student should be able to apply these techniques to professional quality finished pieces.

ART 190 ART: LEGAL AND FINANCIAL MANAGEMENT (3T) 3 credits
 This course is designed to acquaint the student with funding sources, business procedures, and project planning for the visual artist. Topics may include grants, budgeting, legal contracts, and self-promotion. Upon completion, students should demonstrate a knowledge of the basics of managing an art related business.

ART 203 ART HISTORY I (3T) 3 credits
 This course covers the chronological development of different forms of art, such as sculpture, painting and architecture. Emphasis is placed on history from the ancient period through the Renaissance. Upon completion, students should be able to communicate a knowledge of time period and chronological sequence including a knowledge of themes, styles, and of the impact of society on the arts.

ART 204 ART HISTORY II (3T) 3 credits
 This course covers the chronological development of different forms of art, such as sculpture, painting and architecture. Emphasis is placed on history from the Baroque to the present. Upon completion, students should be able to communicate a knowledge of time period and chronological sequence including a knowledge of themes, styles and of the impact of society on the arts.

ART 216 PRINTMAKING I (6E) 3 credits
 This course introduces various printmaking processes. Topics include relief, intaglio, serigraphy, or lithography and the creative process. Upon completion, students should have a basic understanding of the creative and technical problems associated with printmaking.

ART 217 PRINTMAKING II (6E) 3 credits
PREREQUISITE: ART 216 or Permission of instructor
 This course provides the opportunity for the student to study a printmaking process beyond the introductory level. Emphasis is placed on creativity, composition, and technique in the communication of ideas through printmaking. Upon completion, students should demonstrate an understanding of the printmaking process as a creative tool for the expression of ideas.

ART 221 COMPUTER GRAPHICS I (6E) 3 credits
 This course is designed to enhance the student's ability to produce computer generated graphics. Emphasis is on the application of original design to practical problems using a variety of hardware and software. Upon com-

pletion, students should have an understanding of professional computer graphics.

ART 231 WATERCOLOR PAINTING I (6E) 3 credits
 This course introduces materials and techniques appropriate to painting on paper with water-based medium. Emphasis is placed on developing the technical skills and the expressive qualities of watercolor painting. Upon completion, students should be able to demonstrate a basic proficiency in handling the techniques of watercolor and how it can be used for personal expression.

ART 232 WATERCOLOR II (6E) 3 credits
PREREQUISITE: ART 231
 This course advances the skills and techniques of painting on paper using water-based medium. Emphasis is placed on exploring the creative uses of watercolor and developing professional skills. Upon completion, students should demonstrate and compile a body of original paintings that reflects a personal awareness of the media's potential.

ART 233 PAINTING I (6E) 3 credits
 This course is designed to introduce the student to fundamental painting processes and materials. Topics include art fundamentals, color theory, and composition. Upon completion, students should be able to demonstrate the fundamentals of art and discuss various approaches to the media and the creative processes associated with painting.

ART 234 PAINTING II (6E) 3 credits
PREREQUISITE: ART 233
 This course is designed to develop the student's knowledge of the materials and procedures of painting beyond the introductory level. Emphasis is placed on the creative and technical problems associated with communicating through composition and style. Upon completion, students should be able to demonstrate the application of the fundamentals of painting and the creative process to the communication of ideas.

ART 243 SCULPTURE I (6E) 3 credits
 This course provides a study of three-dimensional form by familiarizing students with sculpting media and techniques. Topics include the fundamentals of art and sculpting media with emphasis on the creative process. Upon completion, students should understand the fundamentals of art and three-dimensional form, as well as the various media and processes associated with sculpture.

ART 244 SCULPTURE II (6E) 3 credits
PREREQUISITE: ART 243
 This course is designed to sharpen skills in the media and processes of sculpture. Emphasis is placed on personal expression through three-dimensional form. Upon completion, students should be able to apply the fundamentals of art, their knowledge of form, and the sculptural processes to communicating ideas.

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- ART 253 GRAPHIC DESIGN I (6E) 3 credits**
PREREQUISITE: VCM 180 or Permission of instructor
This course is designed to introduce the study of visual communication through design. Emphasis is placed on the application of design principles to projects involving such skills as illustration, layout, typography, and production technology. Upon completion, students should demonstrate a knowledge of the fundamentals of art and understanding of the relationship between materials, tools and visual communication.
- ART 254 GRAPHIC DESIGN II (6E) 3 credits**
PREREQUISITE: VCM 180 or ART 253
This course further explores the art of visual communication through design. Emphasis is placed on the application of design principles to projects involving such skills as illustration, layout, typography, and production technology. Upon completion, students should be able to apply the knowledge of the fundamentals of art, material and tools to the communication of ideas.
- ART 258 PHOTOGRAPHIC AND MEDIA PROBLEMS (1T, 2E) 2 credits**
This course deals with special problems in the student's area of interest. Emphasis is placed on design, technique and results. Upon completion, the student will be able to produce professional quality photographs in one particular area of photography.
- ART 263 MUSEUM PRACTICE I (2-8E) 1-4 credits**
PREREQUISITE: Permission of instructor
This course provides an introduction to a variety of museum works, with practical training supervised by museum staff. Topics may include promotion, shipping, labeling and hanging of a museum exhibit as well as the study of the work itself. Upon completion, students should understand the activities surrounding a museum exhibit and be able to explain how the experience advanced their knowledge of communicating through art.
- ART 264 MUSEUM PRACTICE II (2-8E) 1-4 credits**
PREREQUISITE: ART 263 or Permission of instructor
This course provides further study of museum artworks, with practical training supervised by museum staff. Topics may include promotion, shipping, labeling and hanging of a museum exhibit as well as the study of the work itself. Upon completion, students should understand the activities surrounding a museum exhibit and be able to explain how the experience advanced their knowledge of communicating through art.
- ART 273 STUDIO PHOTOGRAPHY I (2T, 2E) 3 credits**
This course stresses image-making problems requiring studio or other controlled environment solutions. Lights, props, and related equipment and techniques are utilized. The student will produce quality photographs using studio techniques.
- ART 274 STUDIO PHOTOGRAPHY II (2T, 2E) 3 credits**
PREREQUISITE: PFC 273 or Permission of instructor
This course deals with advanced problems requiring studio or other controlled environment solutions. Lights, props, and related equipment and techniques are utilized. The student will produce quality photographs using studio techniques.
- ART 291 SUPERVISED STUDY IN STUDIO ART I (2-8E) 1-4 credits**
PREREQUISITE: Permission of instructor
This course is designed to enable the student to continue studio experiences in greater depth. Topics are to be chosen by the student with the approval of the instructor. Upon completion, the student should have a greater expertise in a particular area of art.
- ART 292 SUPERVISED STUDY IN STUDIO ART II (2-8E) 1-4 credits**
PREREQUISITE: ART 291, Permission of instructor
This course is designed to enable the student to continue studio experiences in greater depth. Topics are chosen by the student with the approval of the instructor. Upon completion, the student should have greater expertise in a particular area of art.
- ART 293 DIRECTED READINGS IN ART I (3T) 3 credits**
This course offers supervised readings in the literature of visual art. Emphasis is placed on in-depth analysis of the chosen area of study. Upon completion, students should have an extensive knowledge of an advanced area in art and evidence of their work in the form of research.
- ART 294 DIRECTED READINGS IN ART II (3T) 3 credits**
PREREQUISITE: ART 293
This course offers supervised readings in the literature of visual art. Emphasis is placed on an in-depth analysis of the chosen area of study. Upon completion, students should have an extensive knowledge of an advanced area in art and evidence of their work in the form of research.
- ART 299 ART PORTFOLIO (2-8E) 1-4 credits**
PREREQUISITE: Permission of instructor
This course is designed to help the art major in the preparation and presentation of an art portfolio. Emphasis is placed on representing the student's potential as an artist in order to interest employers, clients or schools. Upon completion, students should be able to make a professional presentation of their design and communication skills.
- ASTRONOMY (AST)**
- AST 220 INTRODUCTION TO ASTRONOMY (3T, 2E) 4 credits**
This course covers the history of astronomy and the development of astronomical thought leading to the birth of modern astronomy and its most recent development. Emphasis is placed on the coverage of astronomical instruments and measuring technologies, the solar system, the Milky Way galaxy, important extra-galactic objects, and cosmology. Laboratory is required.

BARBERING (BAR)

- BAR 110 ORIENTATION TO BARBERING (3T) 3 credits**
This course provides an orientation to professional barber-styling. Topics include professional image, basic fundamentals, and the history of barber-styling. Upon completion, the student should be able to identify the core concepts of the profession.
- BAR 111 SCIENCE OF BARBERING (1T, 2E, 3M) 3 credits**
This course introduces the student to the basic science of barber-styling. Topics include anatomy/physiology, disorders, and treatments of the skin, scalp, and hair, and theory of facial and scalp massage. Upon completion, the student should be familiar with the anatomical structures, as well as disorders and treatments of the skin, scalp, and hair.
- BAR 112 BACTERIOLOGY AND SANITATION (3T) 3 credits**
This course provides the theory of bacteriology and sanitation. Topics include the types of bacteria and sanitation procedures. Upon completion, the student should be able to identify types of bacteria and methods of sanitation.
- BAR 113 BARBER-STYLING LAB (9M) 3 credits**
This course provides practical application of barber-styling fundamentals. Emphasis is placed on the care of implements, shampooing, and haircutting. Upon completion, the student should be able to care for his/her implements properly and demonstrate the basic techniques of shampooing and haircutting with only minimal supervision.
- BAR 114 ADVANCED BARBER-STYLING LAB (9M) 3 credits**
This course provides the student with practical experience in haircutting and facial massage. Emphasis is placed on hands-on experience. Upon completion, the student should be able to demonstrate on a model the correct procedures for a facial massage and basic haircut.
- BAR 120 PROPERTIES OF CHEMISTRY (3T) 3 credits**
This course provides the student with a basic knowledge of chemicals used in barber-styling. Topics include the changes produced in the hair and skin through exposure to chemicals, electricity and special light spectrums. Upon completion, the student should understand the proper use of implements and chemicals to treat hair and skin.
- BAR 121 CHEMICAL HAIR PROCESSING (9M) 3 credits**
This course provides the student with knowledge and hands-on experience using chemicals to alter the appearance of hair. Emphasis is placed on the use of chemicals to relax, wave, and soft curl the hair. Upon completion, the student should be competent in the use of chemicals to produce desired structure changes to the hair.

- BAR 122 HAIR COLORING CHEMISTRY (3T) 3 credits**
This course provides the student with a basic knowledge of hair color alteration. Topics include temporary, semi-permanent, and permanent changes. Upon completion, the student should be able to identify and explain the procedures for each classification of hair color alteration.
- BAR 124 HAIR COLORING METHODOLOGY LAB (9M) 3 credits**
This course provides the student an opportunity for practical application of all classifications of chemical hair coloring and processing products in a supervised environment. Emphasis is placed on experience in all classifications of hair coloring and processing procedures.
- BAR 130 MARKETING AND BUSINESS MANAGEMENT (3T) 3 credits**
This course provides the student with marketing and management skills that are essential for successful salon management. Topics include first aid, job search, book-keeping, selling techniques, shop floor plans, shop locations, and legal regulations. Upon completion, the student should be aware of marketing and business management requirements for a successful salon.
- BAR 131 STRUCTURE AND DISORDERS OF NAILS (1.5T, 4.5M) 3 credits**
This course provides the student with the knowledge of nail structure and experience in identifying nail disorders. Emphasis is placed on identifying disorders and on using the correct implements and supplies for healthy nail care and manicures. Upon completion, the student should be capable of providing professional nail care.
- BAR 132 HAIR STYLING AND DESIGN (3T) 3 credits**
This course introduces the student to the art of hair style and design. Topics include the selection of styles to create a mood or complement facial features as well as hair replacement and hair pieces. Upon completion, the student should know the principles of style and design.
- BAR 133 HAIR STYLING AND MANAGEMENT LAB (9M) 3 credits**
This course includes hair styling and management procedure. Emphasis is placed on styling, management, marketing, and legal regulations. Upon completion, the student should be able to integrate a variety of skills and be ready to begin an internship in a salon setting.
- BAR 140 PRACTICUM (10M) 2 credits**
This course provides the student an opportunity to combine knowledge and skill covering all aspects of barber-styling in a professional setting or school lab with minimal supervision. Emphasis is placed on utilization of the knowledge and technical skills covered in the barbering/styling curriculum. Upon completion, the student should be able to function in a professional setting with very little assistance.
- BAR 141 PRACTICUM (10M) 2 credits**
This course provides the student an additional opportunity to combine knowledge and skill covering all aspects of barber-styling in a professional setting or school lab

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with minimal supervision. Emphasis is placed on utilization of the knowledge and technical skills covered in the barbering-styling curriculum. Upon completion, the student should function in a professional setting as a productive employee or manager.

BIOLOGY (BIO)

- BIO 101 INTRODUCTION TO BIOLOGY I (3T, 2E) 4 credits**
Introduction to Biology I is the first of a two-course sequence designed for non-science majors. It covers historical studies illustrating the scientific method, cellular structure, bioenergetics, Mendelian and molecular genetics and a survey of human organ systems. Special attention is paid to biological information that will allow each student to live a healthier life and be better prepared to understand human activity. Laboratory is required.
- BIO 102 INTRODUCTION TO BIOLOGY II (3T, 2E) 4 credits**
PREREQUISITE: BIO 101
Introduction to Biology II is the second of a two-course sequence for non-science majors. It covers the theory of evolution, evolutionary principles and relationships, environmental and ecological topics, classification, and a survey of biodiversity. Each student will be prepared to make informed decisions on environmental and ecological issues. Laboratory is required.
- BIO 103 PRINCIPLES OF BIOLOGY I (3T, 2E) 4 credits**
This is an introductory course for both science and non-science majors. It covers physical, chemical, and biological principles common to all organisms. These principles are explained through a study of cell structure and function, cellular reproduction, basic biochemistry, cell energetics, the process of photosynthesis, and Mendelian and molecular genetics. Also included are the scientific method, basic principles of evolution, and an overview of the diversity of life with emphasis on viruses, prokaryotes, and protists. Laboratory is required.
- BIO 104 PRINCIPLES OF BIOLOGY II (3T, 2E) 4 credits**
PREREQUISITE: BIO 103
This course is an introduction to basic ecological and evolutionary relationships of plants and animals and a survey of plant and animal diversity including classification, morphology, physiology, and reproduction. Laboratory is required.
- BIO 201 HUMAN ANATOMY AND PHYSIOLOGY I (3T, 2E) 4 credits**
PREREQUISITE: BIO 103 or successful completion of BIO 103 challenge exam.
Human Anatomy and Physiology I covers the structure and function of the human body. Included is an orientation of the human body; basic principles of chemistry; a study of cells and tissues; metabolism; joints; the integumentary, skeletal, muscular, and nervous sys-

tems; and the senses. Dissection, histological studies, gross anatomy, and physiology are featured in the laboratory experience. Laboratory is required.

- BIO 202 HUMAN ANATOMY AND PHYSIOLOGY II (3T, 2E) 4 credits**
PREREQUISITE: BIO 103 and BIO 201 or BIO 103 and permission of the instructor.
Human Anatomy and Physiology II covers the structure and function of the human body. Included is a study of basic nutrition; basic principles of water; electrolyte; acid-base balance; and the endocrine, respiratory, digestive, excretory, cardiovascular, lymphatic and reproductive systems. Dissection, histological studies, gross anatomy, and physiology are featured in the laboratory experience. Laboratory is required.
- BIO 220 GENERAL MICROBIOLOGY (2T, 4E) 4 credits**
PREREQUISITE: BIO 103
This course includes historical perspectives, cell structure and function, microbial genetics, infectious diseases, immunology, distribution, physiology, culture, identification, classification, and control of microorganisms. The laboratory experience includes micro-techniques, distribution, culture, identification, and control. Laboratories are required.
- BIO 240 FIELD BIOLOGY (3T, 2E) 4 credits**
PREREQUISITE: BIO 103
This course covers basic principles of taxonomy, classification, and selected ecological concepts. Animal and plant diversity is emphasized through collection, identification, and museum preparation of local flora and fauna. Laboratory is required.
- BIO 250 DIRECTED STUDIES IN BIOLOGY (2-8E) 1-4 credits**
PREREQUISITE: Permission of instructor
This course is designed for independent study in specific areas of biology chosen by the student in consultation with a faculty member and carried out under faculty supervision.
- BIO 251 DIRECTED STUDIES IN BIOLOGY (2-8E) 1-4 credits**
PREREQUISITE: BIO 250 and Permission of instructor
This course is designed for independent study in specific areas of biology chosen by the student in consultation with a faculty member and carried out under faculty supervision.
- BIO 286,287 FIELD STUDIES IN PLANT ECOLOGY I and II (1-2T, 2-4E) 2-4 credits each**
PREREQUISITE: Permission of instructor
These courses introduce a strong field component into our Biology program and expose students to unique ecosystems like the Great Smoky Mountains National Park and the Chihuahuan Desert of Big Bend National Park in western Texas. These laboratory intensive courses introduce plants in selected communities and emphasize identification, sampling and collecting techniques in the field.

BIO 288, 289 FIELD STUDIES IN MARINE BIOLOGY I and II (1-2T, 2-4E) 2-4 credits each
PREREQUISITE: Permission of instructor
 These laboratory intensive courses introduce salt water and marsh environments with emphasis on vertebrates. Pertinent ecological concepts are introduced using sampling, collecting, preserving, and identification techniques. These courses are offered for students to obtain first hand field experience in marine ecosystems especially on the Gulf Coast. In the past students have studied Marine Biology at the Dauphin Island Sea Lab, the Florida State University Marine Laboratory, Dog Island Sound, St. George Island, taken sampling excursions in the Gulf of Mexico aboard research vessels, and studied ornithology and salt water marshes on the Mississippi Sound coastline.

BASIC SKILLS READING (RDG)

RDG 085 DEVELOPMENTAL READING (3T) 3 credits
 This course is designed to improve reading and critical thinking skills. Topics include vocabulary enhancement; extracting implied meaning; analyzing author's purpose, tone, and style; and drawing conclusions and responding to written material. Upon completion, students should be able to comprehend and analyze college-level material.

BASIC STUDY SKILLS (BSS)

BSS 100 STUDY SKILLS (1T) 1 credit
 This course is intended for those who placed into credit-level course work but who are not maintaining satisfactory academic progress toward meeting program goals. Topics include study skills, note taking, learning styles and strategies, test taking, goal setting, and self-assessment skills. Upon completion, students should be able to manage their learning experiences to successfully meet educational goals.

BSS 118 STUDY SKILLS (1T) 1 credit
 This course covers skills and strategies designed to improve study behaviors. Topics include time management, note taking, test taking, memory techniques, active reading strategies, critical thinking, communication skills, learning styles, and other strategies for effective learning. Upon completion, students should be able to apply appropriate study strategies and techniques to the development of an effective study plan.

BUSINESS (BUS)

BUS 100 INTRODUCTION TO BUSINESS (3T) 3 credits
 This is a survey course designed to acquaint the student with American business as a dynamic process in a global setting. Topics include the private enterprise system, forms of business ownership, marketing, factors of production, personnel, labor, finance, and taxation.

BUS 147 INTRODUCTION TO FINANCE (3T) 3 credits
 This course is a survey of monetary and credit systems. Topics include the role of the Federal Reserve System, sources of capital including forms of long-term corporate financing, and consumer credit in the financial structure of our economy.

BUS 150 BUSINESS MATH (3T) 3 credits
 This course is a study of practical business mathematics. Topics include fundamental processes of arithmetic with emphasis on decimals and percentages, markup, discounts, bank reconciliation, simple and compound interest, discounting notes, depreciation methods, and present value.

BUS 177 SALESMANSHIP (3T) 3 credits
 This course provides an introduction to the principles and practices of ethical salesmanship. Topics include industrial and retail selling methods of market analysis, professional salesmanship and sales methods, consumer types, attitudes, and behavior.

BUS 190 MANAGEMENT WORKSHOP (1-3T) 1 - 3 credits
 This course is a part of a series of workshops wherein current topics of interest are presented. They are offered upon demand and can be tailored to the needs of individuals, business and industry.

BUS 190B PROBLEM SOLVING (1T) 1 credit
 The goal of this course is to help students improve problem-solving skills. Emphasis is placed on developing the five-step process for problem solving: Defining the Situation, Stating the Goal, Identifying a Solution, Preparing a Plan, and Taking Action.

BUS 190C TEAMBUILDING (1T) 1 credit
 The goal of this course is to help students identify factors and develop the skills necessary for becoming part of a successful team. Emphasis is placed on developing skills in communication, shared leadership, and conflict resolution.

BUS 190D SELF-MANAGEMENT (1T) 1 credit
 The goal of this course is to help students build skills necessary to take responsibility and adjust to the changing demands of the workplace. Emphasis is placed on developing abilities to adjust to new technologies or processes, upgrading skills, career planning, and personal transitions.

BUS 190E EMPLOYABILITY SKILLS (1T) 1 credit
 The goal of this course is to help students develop skills to make them more employable. Emphasis is placed on developing a professional resume and cover letter, organizing a job search campaign, interviewing, resigning from a position, and accepting new positions.

BUS 190F ORGANIZATIONAL COMMUNICATIONS (1T) 1 credit
 The goal of this course is to help students build personal skills that allow them to communicate effectively in the workplace. Emphasis is placed on verbal, nonverbal, and written communications as they relate to pro-

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professional work habits.

BUS 190G	INTERPERSONAL RELATIONS FOR MANAGEMENT (1T) 1 credit The goal of this course is to help students achieve better interpersonal relationships on the job. Emphasis is placed on the concepts of professional treatment of customers, managing diversity, commitment to quality, managing office politics, developing positive attitudes, and self-discipline.	BUS 190P	PLANNING FOR SUPERVISING HUMAN RESOURCES (1T) 1 credit This course is designed to offer insight into the employee relation side of conducting business. Emphasis is placed on identifying employment needs, training, supervising, and motivating employees.
BUS 190H	TIME/PROJECT MANAGEMENT (1T) 1 credit The goal of this course is to assist students in developing effective time management skills. Emphasis is placed on learning to set priorities, making decisions, delegating, concentrating on specific tasks, and increasing personal productivity.	BUS 190Q	PLANNING MARKET STRATEGY (1T) 1 credit This course is designed to allow owners of businesses to develop a market strategy. Included is a discussion of market analysis, competition, sales and distribution, and pricing strategies.
BUS 190I	DIRECTED READINGS IN MANAGEMENT (1T) 1 credit The goal of this course is to allow students to research a current topic of interest. Topics chosen should benefit the student's professional development or allow for gathering beneficial research for the student's place of work.	BUS 190R	PROMOTIONAL STRATEGIES (1T) 1 credit This course allows students to look specifically at two kinds of promotional strategies: Advertising and Public Relations. Students explore how each of these strategies strongly affects the success of a business.
BUS 190J	ETHICS IN THE WORKPLACE (1T) 1 credit The goal of this course is to allow students to explore the arena of ethics in the workplace. Emphasis is placed on ethics case studies.	BUS 190S	CHOOSING A LOCATION FOR A BUSINESS (1T) 1 credit This course is designed to help students planning to start their own business to choose a suitable location and facility. Course content focuses on site location, purchasing or leasing an existing facility, and arranging layout.
BUS 190K	STRESS MANAGEMENT (1T) 1 credit This course is designed to help students develop skills in managing stress associated with careers in business. Emphasis is placed on developing coping skills such as conflict resolution, delegation, and identifying problems early to avoid unnecessary stress.	BUS 190T	STATISTICAL PROCESS CONTROL (SPC) - VARIABLE DATA (1T) 1 credit This course covers descriptive statistics, types of data, and how to calculate, plot, and analyze various variable charts such as average and range, median and range, and standard deviations. Variable charts are used with measurable data.
BUS 190L	DEVELOPING A BUSINESS PLAN (1T) 1 credit This course is designed to give students the opportunity to develop a personal business plan. The course focuses on the following areas: purpose of a business plan, mechanics of writing a business plan, components of a business plan, and research techniques.	BUS 190U	STATISTICAL PROCESS CONTROL (SPC) - ATTRIBUTE DATA (1T) 1 credit This course addresses the development of non-measurable data into attribute charts for analysis of a process capability. Type of charts covered are P, NP, C and U with emphasis given to development of P-type charts.
BUS 190M	EVALUATING THE ENTREPRENEURIAL PERSONALITY (1T) 1 credit This course is designed to allow students to identify in themselves and others characteristics that are favorable for the successful entrepreneur. Self-analysis and a study of entrepreneurial traits are included.	BUS 190V	MANAGEMENT FOR ENTREPRENEURS (1T) 1 credit This course is an overview of the principles of management as they relate to small and self-owned businesses. Emphasis is placed on planning, organizing, and controlling.
BUS 190N	FINANCING AN ENTREPRENEURIAL ENTERPRISE (1T) 1 credit This course is designed to inform students about the options available for financing an entrepreneurial enterprise. The course allows students to investigate possible sources of financing and to study topics such as break-even analysis, fixed and variable costs, and financial statements.	BUS 190W	CUSTOMER SERVICE STRATEGIES (1T) 1 credit This course is an overview of the principles of customer service. Emphasis is placed on determining elements of customer satisfaction, creating a customer-focused culture, soliciting and using customer feedback, and building a "relationship" with the customer.
		BUS 190X	WORKPLACE READINESS (1-3T) 1-3 credits This course is designed to assess students' workplace skills and help them identify areas of weakness. Skills assessment tools such as WorkKeys will be utilized. Other components of workplace readiness will be included as needed.

BUS 190Y	LEADERSHIP SKILLS (1T) This course is an overview of the characteristics of leadership. Emphasis is placed on what effective leaders do, leadership styles, and the differences between leadership and management.	1 credit
BUS 193	BUSINESS CO-OP I (1T) PREREQUISITE: Successful completion of two (2) business courses This course is part of a series wherein the student works in a degree/program related job. Emphasis is placed on student's work experience as it integrates academic knowledge with practical application through exposure to business and related practices in the working environment. The grade is based on the employer's evaluation of each student's productivity, content of a descriptive report submitted by the student, and student development and assessment of a learning contract.	1 credit
BUS 194	BUSINESS CO-OP II (1T) PREREQUISITE: BUS 193 This course is a part of a series wherein the student works in a degree/program related job. Emphasis is placed on student's work experience as it integrates academic knowledge with practical application through exposure to business and related practices in the working environment. The grade is based on the employer's evaluation of each student's productivity, content of a descriptive report submitted by the student, and student development and assessment of a learning contract.	1 credit
BUS 195	BUSINESS CO-OP III (1T) PREREQUISITE: BUS 194 This course is a part of a series wherein the student works in a degree/program related job. Emphasis is placed on student's work experience as it integrates academic knowledge with practical application through exposure to business and related practices in the working environment. The grade is based on the employer's evaluation of each student's productivity, content of a descriptive report submitted by the student, and student development and assessment of a learning contract.	1 credit
BUS 196	BUSINESS CO-OP IV (1T) PREREQUISITE: BUS 195 This course is a part of a series wherein the student works in a degree/program related job. Emphasis is placed on student's work experience as it integrates academic knowledge with practical application through exposure to business and related practices in the working environment. The grade is based on the employer's evaluation of each student's productivity, content of a descriptive report submitted by the student, and student development and assessment of a learning contract.	1 credit
BUS 197	BUSINESS CO-OP V (1T) PREREQUISITE: BUS 196 This course is a part of a series wherein the student works in a degree/program related job. Emphasis is placed on student's work experience as it integrates academic knowledge with practical application through exposure to business and related practices in the working environment. The grade is based on the employer's eval-	1 credit

BUS 215	BUSINESS COMMUNICATIONS (3T) PREREQUISITE: ENG 101 This course covers written, oral, and nonverbal communications. Topics include the application of communication principles to the production of clear, correct, and logically organized faxes, e-mail, memos, letters, resumes, reports and other business communications.	3 credits
BUS 241	PRINCIPLES OF ACCOUNTING I (3T) This course is designed to provide a basic theory of accounting principles and practices used by service and merchandising enterprises. Emphasis is placed on financial accounting, including the accounting cycle, and financial statement preparation and analysis.	3 credits
BUS 242	PRINCIPLES OF ACCOUNTING II (3T) PREREQUISITE: BUS 241 This course is a continuation of BUS 241. In addition to a study of financial accounting, this course also places emphasis upon managerial accounting, with coverage of corporations, statement analysis, introductory cost accounting, and use of information for planning, control, and decision making.	3 credits
BUS 246	ACCOUNTING ON THE MICROCOMPUTER (3T) PREREQUISITE: BUS 241 This course utilizes the microcomputer in the study of financial accounting principles and practices. Emphasis is placed on the use of software programs for financial accounting principles. Upon completion of this course, the student will be able to use software programs for financial accounting applications.	3 credits
BUS 248	MANAGERIAL ACCOUNTING (3T) PREREQUISITE: BUS 241 This course is designed to familiarize the student with management concepts and techniques of industrial accounting procedures. Emphasis is placed on cost behavior, contribution approach to decision-making, budgeting, overhead analysis, cost-volume-profit analysis, and cost accounting systems.	3 credits
BUS 253	INDIVIDUAL INCOME TAX (3T) This course is intended to familiarize the student with the fundamentals of the federal income tax laws with primary emphasis on those affecting the individual. Emphasis is placed on gross income determination, adjustments to income, business expenses, itemized deductions, exemptions, capital gains/losses, depreciation, and tax credits. Upon completion of this course, the student will be able to apply the fundamentals of the federal income tax laws affecting the individual.	3 credits
BUS 261	BUSINESS LAW I (3T) This course provides an overview of legal principles affecting businesses. Topics include contracts, agency	3 credits

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	and employment, negotiable instruments, bailments and sale of goods.	BUS 280	INDUSTRIAL MANAGEMENT (3T) This course provides an overview of management in an industrial setting. Topics include operations analysis, research and development, physical facilities, production planning, productivity improvement, product flow, quality control, jobs and wages, and employee motivation.	3 credits
BUS 262	BUSINESS LAW II (3T) This course is a continuation of BUS 261. Topics include legal principles related to partnerships, corporations, real property and leases, insurance, security devices, bankruptcy, trust and estates; government regulations of business and labor; civil and criminal liability; and business security.	3 credits		
BUS 263	THE LEGAL AND SOCIAL ENVIRONMENT OF BUSINESS (3T) This course provides an overview of the legal and social environment for business operations with emphasis on contemporary issues and their subsequent impact on business. Topics include the Constitution, the Bill of Rights, the legislative process, civil and criminal law, administrative agencies, trade regulations, consumer protection, contracts, employment and personal property.	3 credits		
BUS 271	BUSINESS STATISTICS I (3T) PREREQUISITE: MTH 112 or appropriate score on math placement test This is an introductory study of basic statistical concepts applied to economic and business problems. Topics include the collection, classification, and presentation of data, statistical description and analysis of data, measures of central tendency and dispersion, elementary probability, sampling, estimating and introduction to hypothesis testing.	3 credits		
BUS 272	BUSINESS STATISTICS II (3T) PREREQUISITE: BUS 271 This course is a continuation of BUS 271. Topics include sampling theory, statistical inference, regression and correlation, chi square, analysis of variance, time series index numbers, and decision theory.	3 credits		
BUS 275	PRINCIPLES OF MANAGEMENT (3T) This course provides a basic study of the principles of management. Topics include planning, organizing, staffing, directing, and controlling with emphasis on practical business applications.	3 credits		
BUS 276	HUMAN RESOURCE MANAGEMENT (3T) This course provides an overview of the responsibilities of the supervisor of human resources. Topics include the selection, placement, testing, orientation, training, rating, promotion, and transfer of employees.	3 credits		
BUS 279	SMALL BUSINESS MANAGEMENT (3M) This course provides an overview of the creation and operation of a small business. Topics include buying a franchise, starting a business, identifying capital resources, understanding markets, managing customer credit, managing accounting systems, budgeting systems, inventory systems, purchasing insurance, and the importance of appropriate legal counsel.	3 credits		
BUS 285	PRINCIPLES OF MARKETING (3T) This course provides a general overview of the field of marketing. Topics include marketing strategies, channels of distribution, marketing research, and consumer behavior.	3 credits		
BUS 291	ALTERNATING BUSINESS CO-OP I (1-3T) PREREQUISITE: Permission of instructor This two-course sequence allows students to alternate semesters of full-time work in a job closely related to the student's academic major with semesters of full-time academic work. Emphasis is placed on a student's work experience as it integrates academic knowledge with practical applications in the business environment. The grade is based on the employer's evaluation of student productivity, evaluative reports submitted by the student, and the development and assessment by the student of a learning contract.	1-3 credits		
BUS 292	ALTERNATING BUSINESS CO-OP II (1-3T) PREREQUISITE: Permission of instructor This two-course sequence allows students to alternate semesters of full-time work in a job closely related to the student's academic major with semesters of full-time academic work. Emphasis is placed on a student's work experience as it integrates academic knowledge with practical applications in the business environment. The grade is based on the employer's evaluation of student productivity, evaluative reports submitted by the student, and the development and assessment by the student of a learning contract.	1-3 credits		
BUS 296	BUSINESS INTERNSHIP I (3T) PREREQUISITE: Minimum 6 semester hours completed. Minimum GPA 2.0 (C) This two-course sequence allows the student to work part-time on a job closely related to his or her academic major while attending classes on a full-time basis. Emphasis is placed on a student's work experience as it integrates academic knowledge with practical applications in the business environment. The grade is based on a term paper, job-site visits by the instructor, the employer's evaluation of the student, and the development and assessment by the student of a learning contract.	3 credits		
BUS 297	BUSINESS INTERNSHIP II (3T) PREREQUISITE: Minimum 6 semester hours completed. Minimum GPA 2.0 (C) This two-course sequence allows the student to work part-time on a job closely related to his or her academ-	3 credits		

ic major while attending classes on a full-time basis. Emphasis is placed on a student's work experience as it integrates academic knowledge with practical applications in the business environment. The grade is based on a term paper, job-site visits by the instructor, the employer's evaluation of the student, and the development and assessment by the student of a learning contract.

CHEMISTRY (CHM)

CHM 099 DEVELOPMENTAL CHEMISTRY (3T) 3 credits

This course is designed for students with little or no background in chemistry. This preparatory course offers a detailed review of the mathematical base for chemistry, including formulas and equations, and covers basic chemical calculations of stoichiometry, gas laws and solutions. Laboratory techniques and safety are also included.

CHM 104 INTRODUCTION TO INORGANIC CHEMISTRY (3T, 2E) 4 credits PREREQUISITE: MTH 098 Elementary Algebra or equivalent math placement score.

This is a survey course of general chemistry for students who do not intend to major in science or engineering and may not be substituted for CHM 111. Lecture will emphasize the facts, principles, and theories of general chemistry including math operations, matter and energy, atomic structure, symbols and formulas, nomenclature, the periodic table, bonding concepts, equations, reactions, stoichiometry, gas laws, phases of matter, solutions, pH, and equilibrium reactions. Laboratory is required.

CHM 105 INTRODUCTION TO ORGANIC CHEMISTRY (3T, 2E) 4 credits PREREQUISITE: CHM 104

This is a survey course of organic chemistry and biochemistry for students who do not intend to major in science or engineering. Topics will include basic nomenclature, classification of organic compounds, typical organic reactions, reactions involved in life processes, function of biomolecules, and the handling and disposal of organic compounds. Laboratory is required.

CHM 111 COLLEGE CHEMISTRY I (3T, 2E) 4 credits PREREQUISITE: MTH 112, Precalculus Algebra or CHM 099

This is the first course in a two-semester sequence designed for the science or engineering major who is expected to have a strong background in mathematics. Topics in this course include measurements, nomenclature, stoichiometry, atomic structure, equations and reactions, basic concepts of thermochemistry, chemical and physical properties, bonding, molecular structure, gas laws, kinetic-molecular theory, condensed matter, solutions, colloids, and some descriptive chemistry topics. Laboratory is required.

CHM 112 COLLEGE CHEMISTRY II (3T, 2E) 4 credits PREREQUISITE: CHM 111

This is the second course in a two-semester sequence designed primarily for the science and engineering student who is expected to have a strong background in mathematics. Topics in this course include chemical kinetics, chemical equilibria, acids and bases, ionic equilibria of weak electrolytes, solubility product principle, chemical thermodynamics, electrochemistry, oxidation-reduction, nuclear chemistry, an introduction to organic chemistry and biochemistry, atmospheric chemistry, and selected topics in descriptive chemistry including the metals, nonmetals, semi-metals, coordination compounds, transition compounds, and post-transition compounds. Laboratory is required.

CHM 220 QUANTITATIVE ANALYSIS (3T, 2E) 4 credits PREREQUISITE: CHM 112

This course covers the theories, principles, and practices in standard gravimetric, volumetric, calorimetric, and electrometric analysis with special emphasis on equilibrium in acid-base and oxidation-reduction reactions and stoichiometry of chemical equations. Laboratory is required and will include classical techniques in chemical analysis, modern methods of chemical separation, and basic instrumental techniques.

CHM 221 ORGANIC CHEMISTRY I (3T, 2E) 4 credits PREREQUISITE: CHM 112

This is the first course in a two-semester sequence. Topics in this course include nomenclature, structure, physical and chemical properties, synthesis, and typical reactions for aliphatic, alicyclic, and aromatic compounds with special emphasis on reaction mechanisms, spectroscopy, and stereochemistry. Laboratory is required and will include the synthesis and confirmation of representative organic compounds with emphasis on basic techniques.

CHM 222 ORGANIC CHEMISTRY II (3T, 2E) 4 credits PREREQUISITE: CHM 221

This is the second course in a two-semester sequence. Topics in this course include nomenclature, structure, physical and chemical properties, synthesis, and typical reactions for aliphatic, alicyclic, aromatic, and biological compounds, polymers and their derivatives, with special emphasis on reaction mechanisms, spectroscopy, and stereochemistry. Laboratory is required and will include the synthesis and confirmation of representative organic compounds with emphasis on basic techniques.

CHM 250 DIRECTED STUDIES IN CHEMISTRY (1T) 1 credit PREREQUISITE: Permission of the instructor.

This course is designed for independent study in specific areas of chemistry chosen in consultation with a faculty member and carried out under faculty supervision. This course may be repeated three (3) times for credit.