Honolulu Community College

Instructional units: Tech 1 (CLOs, PLOs, ILOs)

Honolulu Community College
Date: 11-18-2020

ILO
- Critical Thinking: Effectively analyze arguments, assumptions, and problems, and draw conclusions.
- Information Literacy: Form strategies to locate, evaluate, and apply information, and know the ethical and legal issues surrounding information and information technology.
- Effective Communication: Actively express and exchange ideas through listening, speaking, reading, writing, and other modes of interpersonal expression.
- Quantitative Reasoning: Effectively analyze numerical data, solve quantitative problems, and apply mathematical concepts.
- Career Preparation: Demonstrate knowledge and skills to successfully move to a baccalaureate education or selected vocation.
- Community Awareness and Social Responsibility: Demonstrate and apply an understanding of moral and ethical issues that pertain to the environment, social justice, and cultural diversity.

Transportation and Trades

Aeronautics

Aeronautics Maintenance Technology
- Demonstrate a working knowledge and mechanical ability to inspect, maintain, service and repair aircraft electrical, engine (piston and turbine), airframe structure, flight control, hydraulic, pneumatic, fuel, navigation and instrument systems and other aircraft components specified by Federal Aviation Regulation Part 147
- Display proper behavior reflecting satisfactory work habits and ethics to fulfill program requirements and confidence to prepare for employment
- Identify, install, inspect, fabricate and repair aircraft sheet metal and synthetic material structures
- Maintain and repair any part in any aircraft system of any rotorcraft, light aircraft, air carrier aircraft, glider, or balloon within the regulatory limits imposed by the FAA certification, without error, to ensure the safety of the flying public
- Obtain FAA general mechanic, airframe and powerplant certifications
- Satisfactorily pass the Federal Aviation Administration (FAA) knowledge, oral, practical and written examinations in General, Airframe, and Powerplant subjects

CLO
- AERO130 - General Aircraft Maint I

November 18, 2020 7:49 PM
- Complete maintenance and inspection records.
- Determine areas and volumes of geometric shapes.
- Extract roots and raise numbers to a given power.
- Fabricate and install fluid lines.
- Identify and select cleaning materials.
- Identify and select fuels.
- Identify and treat corrosion.
- Identify appropriate nondestructive testing methods.
- Inspect welds.
- Operate, service and secure aircraft.
- Perform algebraic operations of signed numbers.
- Perform heat treatment.
- Perform precision measurements.
- Perform various types of nondestructive testing.
- Read, comprehend, and apply information from manufacturers and the FAA.
- Select hardware and materials.
- Sketch repairs and alterations.
- Solve ratios, proportions, and percentage problems.
- Use aircraft drawings and schematics.
- Use blueprint information.
- Use graphs and charts.

**AERO131 - Adv Gen Aircraft Maint II**

- Calculate and measure capacitance, inductance, electrical power, voltage, current, and resistance.
- Inspect and service batteries.
- Perform weight and balance record keeping.
- Read and interpret electrical circuit diagrams.
- Use and understand simple machines, sound, fluid and heat dynamics; basic aerodynamics; aircraft structures; and theory of flight.
- Weigh aircraft.

**AERO132 - Powerplant Maintenance I**

- Identify and select lubricants.
- Inspect and repair radial engines.
- Inspect, check, service and repair lubrication systems and components.
- Inspect, service, repair, and troubleshoot ignition systems and components.
- Inspect, service, troubleshoot, and install reciprocating engines.
- Overhaul magnetos and ignition harnesses.
- Overhaul reciprocating engines.
- Repair electrical components.
- Troubleshoot and repair electrical and mechanical indicating systems.

**AERO133 - Airframe Maintenance**

- Apply finishes with paint gun and brush to fabric and metal surfaces.
- Be familiar with magnesium, titanium, aluminum and stainless steel welding procedures.
- Bend sheet aluminum.
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- Demonstrate skill in application of trim and lettering.
- Determine correct registration number sizing.
- Fabricate a honeycomb composite panel.
- Hand form and heat treat aluminum structure.
- Inspect and identify composite structures.
- Inspect and identify flaws in welded structures.
- Install and finish a fabric panel.
- Install and remove rivets without flaws to the rivet or sheet metal.
- Interpret fabric covering instructions.
- Perform bend allowance calculations.
- Perform proper rib lacing.
- Perform simple oxyacetylene procedures and welds.
- Prepare and prime aircraft metals.
- Properly layout rivet patterns.
- Repair damage to sheet aluminum using correct material, rivet number and metal treatment.
- Select and install sheet metal special fasteners.
- Select rivets using correct material, size, and type.
- Solder aircraft wiring.
- Understand use of aircraft paint and finish.

AERO134 - Powerplant Maintenance II
- Inspect and repair heat exchangers, superchargers, and turbine engine airflow and temperature control systems.
- Inspect and repair ice and rain control systems.
- Inspect, check, service, and troubleshoot auxiliary power units.
- Inspect, service, troubleshoot and repair turbine ignition systems.
- Inspect, service, troubleshoot, and repair turbine starting systems.
- Install, troubleshoot and remove turbine engines.
- Overhaul carburetors.
- Overhaul, inspect, check, service, and repair turbine engines.
- Repair and inspect reciprocating and turbine engine fuel metering systems and components.
- Troubleshoot and adjust turbine fuel metering systems.
- Use lubricants and repair lubrication systems.

AERO135 - Airframe Maintenance II
- Assemble, balance, rig, and inspect primary and secondary flight control surfaces.
- Check alignment of structures.
- Inspect, check, service, and repair windows, doors, and furnishings.
- Inspect, check, service, troubleshoot and repair electronic and mechanical flight instruments.
- Inspect, test, and repair fabric, fiberglass, plastics, honeycomb, composite, and laminated structures.
- Install and perform tests of static pressure instrumentation.
- Jack aircraft.
- Perform conformity and airworthiness inspections.
- Rig rotary-wing and fixed-wing aircraft.
- Service, repair, and inspect wood structures.
AERO136 - Powerplant Maintenance III
- Balance propellers.
- Identify and select propeller lubricants.
- Inspect and service propeller synchronizing and ice control systems.
- Inspect and troubleshoot unducted fan systems.
- Inspect, check, service, and troubleshoot turbine driven auxiliary power units.
- Inspect, check, service, troubleshoot and repair fire detection and extinguishing systems.
- Install, check, and service electrical wiring, controls, and components.
- Install, troubleshoot, and remove propellers.
- Repair aluminum propeller blades.
- Repair cooling systems and components.
- Repair exhaust systems and components.
- Repair propeller control and governing systems.
- Troubleshoot and repair thrust reverser systems and components.

AERO137 - Airframe Maintenance III
- Check and service fuel dump systems, pressure fueling systems, and fuel management systems.
- Inspect and repair antennas and electronic equipment.
- Inspect and repair quantity, pressure, and temperature indicating systems.
- Inspect, check and troubleshoot autopilot systems.
- Inspect, check, and service brake and antiskid systems.
- Inspect, check, and service communication and navigation systems.
- Inspect, check, service, and repair landing gear, brakes, wheels, tires, hydraulic and pneumatic power systems and components.
- Inspect, check, service, troubleshoot, and repair fire extinguishing systems.
- Inspect, check, troubleshoot and service heating, cooling, air conditioning, pressurization and oxygen systems and components.
- Inspect, check, troubleshoot and service position warning and indicating systems.
- Repair and inspect electrical systems and components.
- Repair fuel system component.

Architectural Engineering and CAD Technology

Architecture, Engineering and Construction Technologies
- Demonstrate computation, communication, critical thinking, research, and problem-solving skills as well as a sensitivity and appreciation of diversity and community to perform effectively as a team member in a professional, competitive, and diverse work environment and as a responsible member of the community.
- Demonstrate either proficiency in designing and creating the construction documents and a materials estimate for a residential or commercial building, or essential skills necessary for responsibly planning, scheduling, and managing a construction project.
- Demonstrate proficiency in the use of the latest 3D computer modeling software, applicable codes, and industry best practices to create, modify, reconcile, or parse architectural or engineering design and construction documents.
- Draw objects of various orientations as may be prescribed, draw sections and elevations of objects, and interpret drawings identify the relationships of objects or object features to demonstrate visualization and graphic representation proficiency and knowledge.
- Identify or describe the typical characteristics and uses of common construction materials, products, and systems, assess their sustainability, document them in drawings, and make appropriate selections based on design project requirements.
- Model habits and attitudes for success in professional employment, prepare and present a professional resume and portfolio, and demonstrate developed interviewing skills in preparation for employment.

CLO
AEC101 - Constr. Graphics & Conventions
• Define typical construction symbols, line types, and terminology.
• Demonstrate graphical problem-solving skills appropriate to the level of the coursework.
• Describe and explain how complex plan sets are organized.
• Describe the special characteristics of commercial plans and explain how to read and interpret them.
• Identify and describe the components of an exterior wall section.
• Identify and describe the components of site plans and civil plans.
• Identify typical contract documents and describe their function.
• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work, and meet production deadlines.
• Use the full range of tools in a computer 3D modeling program such as SketchUp® to create, modify, and manipulate computer models of objects.
• Utilize software to aide in the reading and interpretation of construction plans.

AEC110 - Basic AutoCad
• Demonstrate graphical and computational problem-solving skills appropriate to the level of the coursework.
• Identify or roughly define the terms, concepts, and standards associated with the topics of the course.
• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work, and meet production deadlines.
• Use the AutoCAD® software program to create drawings from scratch and to modify, manipulate, copy, delete, save, and plot drawings.
• Use the full range of AutoCAD® commands and options and employ shortcuts and time-saving strategies to operate the program at a level of efficiency acceptable for employment as a CAD technician.

AEC111 - Intro. to Professional Ethics
• Analyze a workplace ethical dilemma to identify root issues, apply moral principles to the intentions, motives, and circumstances involved, and suggest one or more solution that adequately addresses the interests of all parties or entities actually or potentially affected by it.
• Correctly explain any one of seven moral principles to an extent and with enough precision to distinguish it from the other principles.
• Distinguish between science and ethics, personal and professional ethics, statements of fact and opinion, reason and emotion, etc.
• Identify or explain the distinguishing features of at least four of the ethical theories presented in the course - egoistic, conventional, utilitarian, duty, virtue, and feminist ethics.

AEC118 - Construction Materials
• Demonstrate model-building and drawing layout proficiencies in the completion of course construction and graphic communication projects related to topics of the course.
• Identify, explain, or compare the common construction materials, products, and systems presented in the course - their sources, properties uses, or methods of installation.
• Participate regularly and appropriately in online group discussions about class material, and seek the help of others as needed.
• Roughly define the common terms and concepts associated with the topics of the course.

AEC160 - Construction Detailing
• Apply the layout, line weight, and other basic drawing and presentation standards to produce drawings of industry standard quality.
• Demonstrate oral and written communication, computation, and problem-solving skills appropriate to the level of the coursework.
• Design the foundation and the floor, wall, and roof framing of a small residential building.
• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work, and meet production deadlines.
• Roughly define the terms, concepts, and standards associated with the topics of the course.
• Use CAD® software to create common construction drawing details complete with labels and dimensions for one or more small buildings.

AEC161 - Bldg Info Modeling Software
• Compose and print a sheet in a building model set.
• Create still renderings, perspective views and walk through animations of a building model using Building Information Modeling (BIM) software.
• Demonstrate oral and written communication, computation and problem-solving skills appropriate to.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEC163</td>
<td>Construction Law</td>
<td>• Differentiate between various contractual relationships by understanding the roles and responsibilities of contractual parties.</td>
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<td>• Know how to handle schedule impacts, delays, accelerations, suspensions and disruption of time related work activities.</td>
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<td>• Recognize, develop and manage a document control system.</td>
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<td>• Understand the importance of contract documents and construction law as they pertain to on-site construction supervisors.</td>
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<tr>
<td>AEC164</td>
<td>Residential Planning &amp; Design</td>
<td>• Clearly and adequately explain a design in presentation of it to a group or students or others, and fairly and objectively critique designs and presentations of others.</td>
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<td>• Demonstrate oral and written communication, computation, and problem-solving skills appropriate to the level of the coursework.</td>
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<td>• Describe and apply reasonable space requirements, code restrictions, site and building orientation constraints, and room proximity standards to development of a residential design.</td>
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<td>• Explain and demonstrate the building design process.</td>
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<td>• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work, and meet production deadlines.</td>
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<td>• Use the AutoCAD® and SketchUp® computer programs (or similar programs) to develop and finalize an architectural design.</td>
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<td>AEC165</td>
<td>Construction Administration</td>
<td>• Demonstrate the ability to create and manage an effective quality control plan.</td>
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<td>• Prepare and update various plans required by government agencies.</td>
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<td>• Properly manage a change proposal log and be able to identify changes in the scope of work for a construction project.</td>
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<td>• Set up and manage the documentation process for a construction project.</td>
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<td>AEC209</td>
<td>Planning and Scheduling</td>
<td>• Apply float, constraints, sorts, and filters, to a computer generated schedule and understand resources and how they can be coordinated into the schedule.</td>
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<td>• Demonstrate the ability to define a schedule of activities and assign reasonable durations to the activities, sequence the activities for a logical workflow.</td>
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<td>• Demonstrate the ability to describe process of project planning and the efficiencies derived from planning.</td>
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<td>AEC210</td>
<td>Residential Working Drawings</td>
<td>• Demonstrate the setup and organization of a residential drawing project set using CAD software.</td>
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<td>• Prepare a brief site data analysis using the current version of the City and County of Honolulu Land Use Ordinance that proves the residential project complies with land use regulations.</td>
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<td>• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work and meet intermediate and final production deadlines.</td>
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<td>• Using Building Information Modeling (BIM) software, create and fully annotate a complete set of two-story residential construction drawings based on an original design and conforming to local Land Use Ordinance regulations.</td>
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<td>AEC211</td>
<td>Construction Est &amp; Bidding</td>
<td>• Define terminology specific to the profession of building estimators.</td>
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<td>• Demonstrate oral and written communication, computation and problem-solving skills appropriate to the level of the coursework.</td>
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<td>• Determine the proper unit of measure for a quantity of specific building components.</td>
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<td>• Prepare a quantity take-off for a small building using Building Information Modeling (BIM) software and export it to spreadsheet software for analysis and pricing to determine bare costs, profit and overhead, and bid price.</td>
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<td>• Prepare an outline of the sequence of events in the estimating process for a building.</td>
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<td>• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work and meet production deadlines.</td>
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<tr>
<td>AEC213</td>
<td>Construction Codes</td>
<td>• Explain the main difference between the land use ordinance and the building code.</td>
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</tbody>
</table>
• Using the Building Code: For both residential and commercial buildings determine the Occupancy/Occupancies for a given building use or list of uses, the minimum occupancy separation for two adjacent occupancies, the appropriate Construction Type for the building's use or list of uses, and the appropriateness of exit system by analyzing the occupant load, number of exits, exit width and distance to exits.

• Using the City and County of Honolulu Land Use Ordinance, determine the necessary zoning and development standards for a commercial building in a commercial zoning district including, but not limited to setbacks, maximum density, building envelope, landscaping, screening, loading and parking.

• Using the City and County of Honolulu Land Use Ordinance, determine the necessary zoning and development standards for a dwelling in a residential zoning district including, but not limited to setbacks, maximum density, building envelope and parking.

AEC217 - Structural Drawing
• Prepare structural floor framing plans, details and sections for buildings with concrete structural systems.
• Prepare structural floor framing plans, details and sections for buildings with steel structural systems.
• Prepare structural floor framing plans, details and sections for buildings with wood structural systems.

AEC236 - Introduction to Sustainability
• Apply tools and methods to conduct a sustainability assessment
• Define sustainability from a multidisciplinary perspective
• Design a project that utilizes sustainable practices
• Illustrate the importance to advance sustainability

AEC237 - Intro to the Built Environ
• Demonstrate oral and written communication skills appropriate to the level of the coursework.
• Describe a building by breaking it down into its 2D and 3D fundamental components.
• Describe the roles of various design professionals in the creation of the built environment.
• Explain some of the coursework taken by architecture students pursuing an architectural degree.
• Give a report on a well known architect.
• List the environmental responses of a building to it's location.

AEC239 - Field Shadow Experience
• Demonstrate listening, processing, and speaking skills in responding appropriately to audience questions and comments.
• Give at least two Powerpoint presentations based on research and firsthand observation that evidence seriousness, depth of involvement, organization, verbal clarity, good grammar (both written and spoken), personal appearance and poise, attention to the audience, and graphical and technical skill.
• Observe and compare the written, oral, and technical skills of employees to the areas of their expertise within an architectural, engineering, or construction firm.
• Observe and describe the apparent organization and preparation involved in presentations by others at office and client meetings.
• On the basis of direct observation, characterize the relationships and forms or levels of communication between employees one to another employees and consultants or contractors, and employees and clients.
• Organize a presentation that explains the history, structure, and operation of an AEC firm, some of its prominent projects, and the relationships and individual responsibilities of people within the firm.
• Research a particular architectural, engineering, or construction firm to learn its structure, history, emphases, community involvement, an representative current and completed projects.

AEC260 - Commercial Working Drawings
• Demonstrate oral and written communication, computation and problem-solving skills appropriate to the level of the coursework.
• Demonstrate the setup and organization of a commercial or multi-family apartment building drawing project set using CAD software.
• Describe some of the building areas that need to be addressed when making a commercial or apartment building accessible for handicapped users.
• Prepare a brief site data analysis using the current version of the City and County of Honolulu Land Use Ordinance that proves the commercial or apartment project complies with land use regulations.
• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work and meet production deadlines.
• Using Building Information Modeling (BIM) software, create and fully annotate a complete set of multi-family residential or commercial construction drawings based on an original design and conforming to local Land Use Ordinance regulations.

AEC261 - Building Services
• Demonstrate oral and written communication, computation and problem-solving skills appropriate to the level of the coursework.
• Demonstrate the use of the Psychrometric Chart to explain the relationships of dry bulb temperature, wet bulb temperature, relative humidity and the dew point of air to each other.
• Illustrate the different components in the compression refrigeration cycle.
• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work and meet production deadlines.
• Using Building Information Modeling (BIM) software, create models and construction drawings of vertical circulation (elevators, escalators), air distribution, water supply, drainage/waste/vent and electrical distribution systems in a building to maximize efficiency and minimize resource waste.

AEC263 - Virtual Construction
• Create complex schedules in Revit.
• Create various Revit families.
• Draw viewpoints, sections, and animations in Navisworks.
• Perform clash detections in Navisworks.

AEC264 - Adv Modeling & Presentation
• Create 30 models that include lights and materials to create photorealistic renderings and animations.
• Create 30 objects from 20 objects using modification commands in 30 software.
• Create complex 30 models using additive and subtractive modeling techniques in 30 software.
• Export 30 animation movies for viewing using 30 software.
• Export 30 files for printing on a 30 Printer.
• Model 30 primitives using 30 modeling software.
• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work and meet production deadlines.

AEC265 - Construction Inspection
• Demonstrate dexterity with tables, charts, and guidelines contained in codes.
• Demonstrate oral and written communication, computation, and problem-solving skills appropriate to the level of the coursework.
• Describe commonly used building codes, construction classifications and occupancy categories.
• Determine if a project meets code standards in a variety of projects.
• Explain safety practices and procedures in construction.
• Recognize and describe the methods, techniques and requirements in construction inspections.
• Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work, and meet inspection deadlines.
• Roughly define the terms, concepts, and standards associated with the topics of the course.

AEC277 - Land Surveying I
• Describe and perform precise horizontal angle measurements.
• Describe different kinds of surveying.
• Describe different methods of determining elevations, and be able to choose the appropriate method for a given application.
• Describe different methods of measuring horizontal distances, and be able to choose the appropriate method for a given application.
• Describe the basic principles of the Global Positioning System (GPS).
• Explain the difference between plane surveying and geodetic surveying.
• Perform practical skills such as setting simple control points for a construction survey and laying out a curve for a roadway.
• Perform topographic surveys and create views based on that data.
• Setup and use computer spreadsheets to perform calculations related to taping corrections, elevation adjustments, and traverse adjustments.

AEC278 - Land Surveying II
• Demonstrate a detailed working knowledge and application of related computer hardware and software.
• Demonstrate a detailed working knowledge and application of standard field equipment.
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- Demonstrate knowledge with comprehensive field note taking, plan reading and preparation.
- Demonstrate more detailed knowledge of survey computations, types of surveys and field operations.
- Describe the basic principles of the profession.

**AEC280 - Site Modeling**
- Demonstrate written communication, computation, and graphical problem-solving skills appropriate to the level of the course.
- Draw, label, and explain property boundary lines of prescribed lengths and directions in either bearing or azimuth formats.
- Identify or roughly define the terms, concepts, and standards associated with the topics of the course.
- Manipulate contour lines in topographic drawing models to represent excavations for level building areas or level or inclined driveways and roads with specific or maximum grades and embankment slopes.
- Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work, and meet production deadlines.
- Use point descriptions, draw and label contour lines that indicate topography in land drawings, and "read" contour lines to explain land forms.
- Use various CAD software programs to place and label points in drawings, import points from datasets, create and manage point groups, create and label property boundary and contour lines, and run various surface analyses.

**AEC289 - Prep for Employment in AEC**
- Compose and print images of work for inclusion in a portfolio.
- Correctly and completely fill out an employment application.
- Create a layout that accentuates presented work in a portfolio.
- Create a professional impression of oneself at a job interview and effectively respond to common, uncommon, and even illegal interview questions.
- Create a professional resume and well-written cover letter.
- Create, maintain, and present a professional portfolio.
- Explain the proper use of text in relation to images when presenting a portfolio.
- Enumerate some of the common questions that are asked at job interviews, and give a pre-planned response to each.
- Model and describe attitudes, work habits, and other factors that relate to success on the job after employment is obtained.
- Select appropriate materials for inclusion in a portfolio.

**Auto Body Repair and Painting**

**Auto Body Repair and Painting**
- Create positive relationships with customers and co-workers in the work environment that will effectively support the work to be accomplished and promote customer satisfaction.
- Demonstrate personal and professional health and safety practices required for the Auto Body industry.
- Demonstrate professional work ethics and standards that are expected when working in varied situations in the industry.
- Exercise sound choices and explain reasons when undertaking simple and diverse endeavors.
- Work independently as well as interdependently to demonstrate professionalism and integrity with customers, co-workers, managers and vendors.

**CLO**

**ABRP73 - Collision Prep & Panel Align**
- Apply masking materials, remove or protect adjacent panels and parts so needed repairs can be completed.
- Demonstrate fundamental procedures to properly remove and install exterior trim and moldings.
- Demonstrate safety related practices while performing collision repair work.
- Demonstrate the fundamental procedures to locate and repair air, water, and dust leaks related to panel alignment.
- Explain why proper panel alignment is important, and demonstrate the various methods that can be used to align panels.
- Properly wash a vehicle, apply wax and grease remover, and remove corrosion protection from the repair area.
- Read and understand the operations listed on a damage report, than develop a plan to repair the vehicle.
- Remove, install, and align bumpers.
• Select and use the proper tools and equipment needed for removing broken bolts and repairing damaged threads.
• Select and use the proper tools and equipment needed to remove and install deck lid lock cylinders.
• Select and use the proper tools and equipment needed to remove and install door locks and handles.
• Select and use the proper tools and equipment needed to remove and install interior door trim panels.
• Select and use the proper tools and equipment to remove, install, and align bolt-on panels.
• Select the proper tools and equipment and follow the necessary safety procedures while removing, installing, and aligning fenders and doors.
• Select the proper tools and equipment and follow the necessary safety procedures while removing, installing, and aligning hoods and deck lids.
• Use trim removal tools to properly remove trim from a vehicle.

ABRP75 - Door Skin Align & Replace
• Apply the principles and techniques for removing and replacing a damaged welded door skin.
• Demonstrate knowledge of the fundamental procedures in removing and replacing a damaged bonded door skin.
• Demonstrate knowledge of the fundamental procedures in the removal and reinstallation of a sunroof.
• Demonstrate knowledge of the fundamental procedures, principles and techniques to straighten a damaged door frame.
• Remove and install hinged auto glass parts.
• Remove and reinstall moveable door glass.

ABRP78 - Collision Damage Analysis
• Inspect a damaged vehicle and identify various types of damage.
• Interpret body dimension specification sheets and locate key reference points on a vehicle.
• Set up and use various, types of measuring systems.
• Understand how a computerized measuring system is used to identify damage on a vehicle.
• Understand how a dedicated fixture system is used to identify damage on a vehicle.
• Understand how a universal measuring system is used to identify collision damage.
• Use a set a datum line gauges to identify height damage.
• Use a tram gauge to measure vehicle length and width damage.
• Use centering gauges to determine vehicle centerline misalignment.

ABRP79 - Structural Straighten Tech
• Properly mount and anchor a vehicle to a pulling system.
• Select and set up different types of pulling equipment.
• Understand hot and cold stress relief methods in the repair of collision damaged parts.
• Understand the proper techniques needed to be used when working with high strength steel in collision repairs.
• Understand the techniques used to pull and straighten a front end damaged vehicle.
• Understand the techniques used to pull and straighten a rear end damaged vehicle.
• Understand the techniques used to pull and straighten a vehicle with side impact damage.

ABRP80 - Panel Replacement
• Explain the repair procedures for full or partial panel replacement.
• Understand the techniques used to complete a full body section repair.
• Understand the techniques used to repair and replace a floor pan and truck floor.
• Understand the techniques used to repair or replace a complete rail assembly.
• Understand the techniques used to repair or replace a rail section.
• Understand the techniques used to repair or replace a rocker panel.
• Understand the techniques used to section or completely replace a B-pillar.
• Understand the techniques used to section or completely replace an A-pillar.
• Use the information provided to properly select various types of joints used in sectioning.

**ABRP101 - Foundation to Auto Body Repair**
• Demonstrate the ability to effectively apply and finish body filler.
• Demonstrate the ability to properly operate the MIG welder and perform basic welds.
• Demonstrate the ability to properly prepare the area for refinishing.
• Demonstrate the ability to properly prepare the vehicle for refinishing.
• Demonstrate the ability to safely operate and manipulate materials and equipment for refinishing.
• Demonstrate the necessary safety precautions needed to protect themselves while working in the trade.
• Display the proper technique needed in the safe operation of hand and power tools.
• Explain the different structural designs of the modern vehicle and its components.
• Explain the importance of proper alignment of bolt on body components.
• Identify the basic components of the vehicle.
• Identify the necessary tools needed in the removal of vehicle components.
• Select and manipulate necessary tools needed to repair minor body damages.
• Select appropriate materials, tools and equipment necessary to carry out assigned projects.

**ABRP102 - Intermediate Auto Body Repair**
• Demonstrate an understanding of the correct repair process when working with aluminum.
• Demonstrate the ability to plastic filler finish medium size damages to complex bodylines and advance contours of the modern vehicle.
• Demonstrate the safe and proper operation of intermediate tools and equipment needed to fix advanced damages on the modern vehicle.
• Describe the recommended procedures to following during and after repair to maintain factory corrosion protection.
• Develop a basic estimate and follow its interpretation of tasks needed to repair the vehicle.
• Explain collision energy management on the modern vehicle, its subsequent damages and the relative repair process.
• Explain the proper repair method needed when replacing welded on body components.
• List the basic safety precautions the technician should follow when working with aluminum.
• Manipulate the different repair methods, tools, and materials to properly repair composite components.
• Select needed procedures to properly identify the various automotive composites.
• Select the proper tools and materials needed to prepare the vehicle for delivery.

**ABRP103 - Transition Class to Industry**
• Describe two things of what you observed and how you would change it if you could change it to make it better or more efficiently from your point of view.
• Develop a cover letter and resume.
• Explain basic mechanical terminology used in vehicle repair.
• Explain the application of silicon bronze MIG welding in auto body repair.
• Explain the different repair strategies utilized when repairing a unitized vehicle versus conventional frames.
• Give a presentation that is based on the student learning outcomes related to the internship.
• Identify common mechanical components that may be damaged in a collision.
• Intern successfully at a place of business that is in line with the transportation industry and list the various career paths available to an individual at the place of business.
• List the fundamental steps to properly set up and tune an aluminum MIG welder.
• Observe and describe the attributes of the business that you feel contributes to its success.
• Observe and list the necessary written, oral, math and technical skills of employees to the areas of their expertise within the business environment.
Automotive Mechanics Technology

Automotive Technology

• Gain employment in the automotive industry in any of the eight NATEF areas: engine repair, automatic transmission/transaxle, manual drive train and axles, suspension and steering, brakes, electrical/electronics systems, heating and air conditioning, and engine performance
• Gain personal knowledge and experience in vehicle repair
• Increase their marketability through learning time management and team work skills

CLO

AMT121 - Intro to Automotive Mechanics
• Articulate ideas and theory related to content area.
• Communicate effectively to gather and convey industry related information.
• Identify and properly use basic hand tools and precision measuring equipment.
• Identify and repair fasteners.
• Identify hazardous materials and explain its impact on people and the environment.
• Identify systems and components of an automobile.
• Identify various career opportunities in the automotive field.
• Manipulate automotive tools and equipment.
• Operate automotive equipment and specialty tools.
• Perform basic vehicle maintenance.
• Perform majority of the NATEF tasks related to content area.
• Perform safety procedures in an automotive repair facility.
• Properly use technical service database and manuals.
• Work independently and inter-dependently in an automotive repair facility.

AMT122 - Survey of Automotive Tech.
• Articulate ideas and theory related to content area.
• Communicate effectively to gather and convey industry related information.
• Describe the eight general automotive systems in a vehicle.
• Identify and properly use basic hand tools and precision measuring equipment.
• Identify and repair fasteners.
• Identify hazardous materials and explain its impact on people and the environment.
• Identify systems and components of an automobile.
• Identify various career opportunities in the automotive field.
• Manipulate automotive tools and equipment.
• Operate automotive equipment and specialty tools.
• Perform majority of the NATEF tasks related to content area.
• Perform safety procedures in an automotive repair facility.
• Properly use technical service database and manuals.
• Work independently and inter-dependently in an automotive repair facility.

AMT130 - Engines
• Communicate effectively to gather and convey industry related information.
• Function safely in an automotive environment.
• Operate automotive equipment and specialty tools.
• Perform all of the NATEF tasks in the following sections: General Engine Diagnosis, Removal and Re-installation (R&R); Cylinder Head and Valve Train Diagnosis & Repair; Engine Block Diagnosis & Repair; Lubrication and Cooling System Diagnosis & Repair. Refer to the NATEF task list on website for a complete list of individual tasks.
• Work independently and inter-dependently in an automotive repair facility.

AMT140 - Electrical Systems I
• Communicate effectively to gather and convey industry related information.
• Function safely in an automotive environment.
• Operate automotive equipment and specialty tools.
• Perform all of the NATEF tasks in the following sections: General Electrical System Diagnosis, Battery Diagnosis & Service, Starting System Diagnosis & Repair, Charging System Diagnosis & Repair, Lighting System Diagnosis & Repair. Refer to the NATEF task list on website for a complete list of individual tasks.
• Work independently and inter-dependently in an automotive repair facility.

AMT142 - Electrical Systems II
• Communicate effectively to gather and convey industry related information.
• Function safely in an automotive environment.
• Operate automotive equipment and specialty tools.
• Perform all of the NATEF tasks in the following sections: Gauges, Warning Devices and Driver Information System Diagnosis & Repair; Horn and Wiper/Washer System Diagnosis & Repair; Ignition System Diagnosis & Repair; General Engine Diagnosis; Computerized Engine Control Diagnosis & Repair. Refer to the NATEF task list on website for a complete list of individual tasks.
• Work independently and inter-dependently in an automotive repair facility.

AMT143 - Air Conditioning
• Communicate effectively to gather and convey industry related information.
• Function safely in an automotive environment.
• Operate automotive equipment and specialty tools.
• Perform all of the NATEF tasks in the following sections: AC System Diagnosis & Repair; Refrigeration System Component Diagnosis & Repair; Heating, Ventilation and Engine Cooling System Diagnosis & Repair; Operating System and Related Controls Diagnosis & Repair; Refrigerant Recovery, Recycling and Handling. Refer to the NATEF task list on website for a complete list of individual tasks.
• Work independently and inter-dependently in an automotive repair facility.

AMT146 - Powertrain & Manual Trans
• Communicate effectively to gather and convey industry related information.
• Function safely in an automotive environment.
• Operate automotive equipment and specialty tools.
• Perform all of the NATEF tasks in the following sections: General Drive Train Diagnosis, Clutch Diagnosis & Repair, Transmission/Transaxle Diagnosis & Repair, Driveshaft and Half Shaft/Universal and Constant Velocity (CV) Joint Diagnosis & Repair, Drive Axle Diagnosis & Repair, Four-wheel Drive/All-wheel Drive Component Diagnosis & Repair. Refer to the NATEF task list on website for a complete list of individual tasks.
• Work independently and inter-dependently in an automotive repair facility.

AMT151 - Automatic Transmiss/Transaxles
• Communicate effectively to gather and convey industry related information.
• Function safely in an automotive environment.
• Operate automotive equipment and specialty tools.
• Perform all of the NATEF tasks in the following sections: General Transmission & Transaxle Diagnosis, Transmission & Transaxle Maintenance and Adjustment, In-vehicle Transmission & Transaxle Repair, Off-vehicle Transmission & Transaxle Repair. Refer to the NATEF task list on website for a complete list of individual tasks.
• Work independently and inter-dependently in an automotive repair facility.

AMT153 - Brakes
• Communicate effectively to gather and convey industry related information.
• Function safely in an automotive environment.
• Operate automotive equipment and specialty tools.
• Perform all of the NATEF tasks in the following sections: General Brake System Diagnosis, Hydraulic System Diagnosis & Repair, Drum Brake Diagnosis & Repair, Disc Brake Diagnosis & Repair, Power Assist Units Diagnosis & Repair, Miscellaneous (Wheel Bearin gs, Parking Brakes, Electrical I, etc.) Diagnosis & Repair, Anti-lock Brake & Traction Control Systems. Refer to the NATEF task list on website for a complete list of individual tasks.

• Work independently and inter-dependent ly in an automotive repair facility.

AMT155 - Suspension and Steering
• Communicate effectively to gather and convey industry related information.
• Function safely in an automotive environment.
• Operate automotive equipment and specialty tools.

• Perform all of the NATEF tasks in the following sections: General Suspension & Steering System Diagnosis, Steering System Diagnosis & Repair, Suspension System Diagnosis & Repair, Wheel Alignment Diagnosis, Adjustment & Repair, Wheel and Tire Diagnosis & Repair. Refer to the NATEF task list on website for a complete list of individual tasks.

• Work independently and inter-dependently in an automotive repair facility.

AMT167 - Engine Performance
• Communicate effectively to gather and convey industry related information.
• Function safely in an automotive environment.
• Operate automotive equipment and specialty tools.

• Perform all of the NATEF tasks in the following sections: General Engine Diagnosis; Computerized Engine Controls Diagnosis & Repair; Ignition Systems Diagnosis & Repair, Fuel, Air Induction and Exhaust Systems Diagnosis & Repair; Emission Control Systems Diagnosis & Repair; Engine Related Service. Refer to the NATEF task list on website for a complete list of individual tasks.

• Work independently and inter-dependently in an automotive repair facility.

Blueprint Reading

PLO
No PLOs

CLO

BLPR22 - Blueprint Reading
• Add and subtract dimensions and express results in feet and inches.
• Calculate to find the missing dimensions.
• Distinguish between waste pipes and soil pipes.
• Draw simple objects to a given scale.
• Explain importance of plumbing traps and vents.
• Explain the common uses and limitations of typical construction materials.
• Explain the differences between plans, sections, and elevations.
• Explain the principles of orthographic drawing and read drawings presented orthographically.
• Explain the sheet numbering system and information contained in title blocks.
• Explain the standard arrangement of Drawings and Specifications in a set of blueprints.
• Give the names of wood frame building components.
• Identify common Civil Plan symbols.
• Identify common Floor Plan symbols.
• Identify common materials by reading symbols in construction drawings.
• Identify several pipe materials, fittings, and appropriate joining methods.
• Identify the common electrical wiring symbols.
• Make a freehand sketch of a simple mechanical object that is clear enough for another tradesperson to understand without excessive notes or other explanation.
• Name at least three types of building foundations.
• Use architectural scales to obtain approximate sizes of items from blueprints.
• Use the system of schedules in drawings, to reference particular objects.

Carpentry

Carpentry
• Demonstrate personal and professional health, fitness and safety practices required for the building and construction occupations
• Gain employment in the Carpentry Industry
• Interact with customers and coworkers on construction jobs in ways that effectively support the work to be accomplished and promote customer satisfaction.
• Practice Quality Workmanship
• Use appropriate materials, tools, equipment and procedures to carry out work on construction projects.

CLO

CARP20 - Carpentry Basics
• Construct a real world project.
• Demonstrate knowledge and application of technical math.
• Identify and use appropriate tools and equipment, materials, and procedures to complete construction projects according to industry standards.
• Identify characteristics of the Carpentry Industry.

CARP22 - Concrete Form Construction
• Demonstrate knowledge of concrete forming construction within the building industry.
• Demonstrate practical and technical skills.
• Describe hazardous and safety issues within the work area.
• Explain concrete forming processes.
• Explain the different types of techniques, methods, and terms used in concrete formi.

CARP26 - Carpentry I
• Apply math skills to measure, lay out, fabricate, and assemble project components.
• Attain and maintain a standard of ethics and quality craftsmanship consistent with the trade.
• Estimate, use, conserve, and reuse materials in an environmentally responsible manner.
• Maintain and improve shop conditions for increased safety, efficiency, and productivity.
• Use nomenclature consistent with the carpentry trade.
• Utilize acquired skills to improve the educational experience of others

CARP30 - Blueprint Read for Carpenters
• Communicate ideas graphically through sketches and rough drawings according to industry standards.
• Interpret drawings from construction projects.
• Obtain specific information from blueprints.

CARP41 - Rough Framing & Ext Finish
• Apply roof sheathing and coverings.
• Assemble sills and girders.
• Calculate rafter length, cut and assemble roof.
• Create a material take-off list.
• Frame walls and partitions.
• Identify framing members.
• Install ceiling joists.
• Layout a building.
• Place joists for floors.
CARP42 - Finishing
- Build and install finishing members (windows, doors, stairs, cabinets, trimming members).
- Create a material take-off list.
- Demonstrate skills and knowledge used in finishing.
- Identify and install finishing members.

Commercial Aviation

PLO
- No PLOs

CLO
- No CLOs

Diesel Mechanics

Diesel Mechanics Technology
- Apply theory and principles for proper diagnosis, repair, and maintenance in the heavy-duty truck equipment industry.
- Demonstrate ability to communicate effectively to gather and convey information.
- Function safely in a heavy equipment shop environment.
- Practice the minimum essential mental, physical, and behavioral skills necessary to maintain professional proficiency.
- Work collaboratively with others as well as independently.

CLO

DISL20 - Technical Practices
- Demonstrate basic rigging methods of rope, cable and chain.
- Demonstrate the proper and safe use of cleaning equipment.
- Demonstrate the proper methods of using threading tools to cut and trace threads.
- Demonstrate the removal of a broken bolt or stud.
- Describe the 5 ways that industry classifies threaded fasteners.
- Discuss about how the working angles of lifting equipment affect the safe working load.
- Discuss about the safe handling and disposal of hazardous wastes.
- Distinguish between the correct and incorrect methods of using and maintaining tools.
- Explain about the safety precautions to be used when operating electric, pneumatic and hydraulic driven power tools with attachments.
- Explain how to identify and measure fittings, tubing, pipe and hose.
- Identify lubricants & sealants used in the diesel field.
- Identify specialty tools by use of manufactures manuals and part numbers.
- List 5 different kinds of personal safety gear and how they protect you.
- Manipulate and read precision measuring instruments with care and accuracy.
- Operate hoisting and lifting equipment correctly and safely.
- Sharpen a twist drill bit.

DISL22 - R & R Components
- Communicate with fellow co-students and instructors when working on projects.
- Demonstrate ability to safely raise, support and lower truck suspension and frame.
- Demonstrate good housekeeping by keeping clean and organized work areas.
- Describe why adjustments are needed on selected project components.
- Discuss weight, stability, balance, leverage and alignment as they relate to projects.
- Evaluate the many different methods to remove, raise lower support, and install components safety, technique and efficiency.
Honolulu Community College

Instructional units: Tech 1 (CLOs, PLOs, ILOs)

• Fill out project sheet information and comments.
• Look up and record specifications used in torquing hardware.
• Match the names of major components and their function from the R & R project list.
• Perform proper adjustments to selected project components.
• Select and demonstrate safe and correct hands on technics during project assignments.

DISL24 - Operator Orientation
• Analyze gauges and indicators while operating equipment.
• Describe procedure of raising and lowering a load with the forklift.
• Discuss a operators professional.
• Discuss problems of unqualified operators moving equipment.
• Identify equipment operating systems.
• Interpret equipment operating guide manuals.
• Perform a pre trip inspection and checklist on a truck and forklift.
• Properly guide an equipment operator in and out a tight are.
• Safely move a forklift with load thru a maze.
• Safely move a truck in and out of a work stall.
• Safely use a guide when operating equipment in a tight area.

DISL27 - Preventive Maintenance
• Demonstrate the ability to inspect med/heavy truck Engine, Cab and Hood, Frame and Chassis, and Electrical/Electronics systems.
• Review, record, and create maintenance documents.
• Verify an operators concern as it applies to Med/Heavy duty truck operation.

DISL31 - Drive Train
• Differentials: Demonstrate ability to use a 5 ton press and arbor press.
• Differentials: Describe procedure to remove and replace bearing, cup and oil seal.
• Differentials: Discuss failure analysis and identify marks.
• Differentials: Explain how to preload pinion bearings.
• Differentials: Identify components and their functions in a differential.
• Differentials: List preventive maintenance procedures.
• Differentials: Locate and identify model, serial and part book.
• Differentials: Make a part list using a parts book.
• Differentials: Match complaints to trouble shooting guide.
• Differentials: Point out the power flow from drive shaft to wheels.
• Differentials: Select and use tools, service manuals and measuring instruments.
• Standard Transmission: Correctly disassemble & reassemble a complete transmission.
• Standard Transmission: Demonstrate proper use of hand and specialty tools.
• Standard Transmission: Describe the lubrication system.
• Standard Transmission: Discuss failure analysis items using a parts book.
• Standard Transmission: Discuss the high-low shift in the multiple speed auxiliary section.
• Standard Transmission: Explain the air system on fuller transmission.
• Standard Transmission: Install a PTO (power take-off) and adjust backlash.
• Standard Transmission: List preventive maintenance procedures.
• Standard Transmission: List the names of transmission components and their functions.
• Standard Transmission: Locate and identify model, serial and part numbers.
• Standard Transmission: Make a parts list of selected items using a parts book.
• Standard Transmission: Point out the power flow threw a transmission in any gear.

DISL34 - Brakes (Air and Hydraulic)
• Connect, operate and troubleshoot a single air brake system.
• Correctly disassemble and assemble a disc brake, s-cam and wedge brake assembly.
• Define the use and operation of manual and automatic.
• Demonstrate refinishing of wheel cylinders, drum and disc assemblies.
• Demonstrate the proper procedure to set wheel bearing preload.
• Describe how a self adjusting brake works.
• Describe the major components and operation of parking and emergency brake systems.
• Explain the operation of a dual air brake system.
• Explain the purpose and principles of a braking system.
• Identify a vacuum and hydraulic brake booster.
• Identify parking, emergency and antilock brake components with their names and function.
• Perform proper procedures to bleed air from hydraulic brakes.

DISL36 - Suspension and Steering
• Demonstrate how to check and evaluate driveline working angles.
• Demonstrate replacement procedures to repair a defective suspension system.
• Describe the components and operation of a recirculating ball and a worm roller type steering gear.
• Describe the procedure to inspect front axle components for wear.
• Explain how to check and adjust the preload and backlash on a manual steering gear.
• Explain how toe, caster, camber, axle inclination, turning radius, and axle alignment affect tire wear, handling and directional stability.
• Explain the operation of a power steering system and identify the system's components.
• Explain the relationship between suspension system alignment and axle equipment.
• Identify and describe the four types of suspension systems used on today's heavy-duty trucks.
• Identify the steering system components on a heavy-duty truck.
• List the difference between static and dynamic methods of wheel balancing.
• Name the basic suspension parts and their function in a spring, rubber cushion, air bag, equalizing beam, and torsion bar systems.

DISL41 - Diesel Engines
• Assemble engine in a organized, clean and safe manner.
• Demonstrate safe work habits.
• Demonstrate use of the engine service manual by locating specific information on R&R components, model numbers, operating specifications, torque chart values, and systems schematics.
• Disassemble engine in a organized, clean and safe manner.
• Locate and record serial and model numbers from the engine.
• Perform component inspections and measurements and compare with specifications in engine service manual for component reusability.

DISL52 - Electrical/Electronic Systems
• Apply Ohm's law to measure voltage, amperage, and resistance in a circuit.
• Describe a batteries function, classification and maintenance.
• Draw the charging system schematic of the DIMCH flatbed truck.
• Explain the function of and differences between switches, relays and solenoids.
• Identify and describe function of basic electrical tools, test instruments and equipment.
Honolulu Community College

Instructional units: Tech 1 (CLOs, PLOs, ILOs)

- Identify electrical components and symbols on a wiring diagram.
- Identify the components and their functions in electric, air and hydraulic starting systems.
- List the 7 advantages and disadvantages of starting aids and when to use them.
- Match a list of electrical terms to their correct definitions.
- Match the function of each electronic component on a DEFI system engine.
- Perform a battery condition load test.
- Perform a charging system output test and check for circuit voltage drop.
- Properly crimp and solder connections between conductor and terminals.
- Select the proper conductor size and termination from the instructor given values.
- Trace and test electrical circuits and components on accessory systems.

**DISL56 - Hydraulics**
- Calculate problems using hydraulics terms to their correct definitions.
- Correctly assemble hydraulic circuits on a portable fluid trainer.
- Determine correct values using a flow chart.
- Disassemble, inspect, and reassemble various hydraulic components by following instruction and filling in a task sheet.
- Explain about hydraulic system safety, inspection and component replacement.
- Identify 3 separate hydraulic systems on the DIMCH flatbed dump truck.
- Identify and describe the function of 8 different hydraulic components as pointed out by instructor.
- Identify components and fluid flow on a hydraulic schematic.
- List 3 advantages and disadvantages of hydraulics.
- List probable causes of hydraulic system failures.
- Match a list of hydraulic terms to their correct definitions.
- Name Pascal's 4 laws of hydraulics.
- Recognize and identify hydraulic symbols.

**DISL61 - Heating, Ventilation, and Air**
- AC System Diagnosis & Repair.
- Communicate effectively to gather and convey industry related information.
- Function safely in an automotive environment.
- Heating Ventilation and Engine Cooling System Diagnosis and Repair.
- Operate automotive equipment and specialty tools.
- Operating System and Related Controls Diagnosis and Repair.
- Perform all of the NATEF tasks that are outlined in each section listed below. Refer to the NATEF task list on website for a complete list of individual tasks.
- Refrigerant Recovery, Recycling and Handling.
- Refrigeration System Component Diagnosis and Repair.
- Work independently and inter-dependently in an Med/Heavy truck repair facility.

**Electrical Installation and Maintenance Technology**

**Electrical Installation & Maintenance Technology**
- Calculate electrical circuit loads and design/draw the electrical circuits.
- Comply with published electrical codes and safety standards.
- Install electrical systems/equipment in new construction under supervision of a journey person.
- Select and order appropriate electrical parts (materials) based on blueprints and drawings.
- Troubleshoot, repair, and conduct routine maintenance of electrical systems/equipment.
• Work independently and inter-dependently on a construction and/or maintenance project meeting industry standards.

**CLO**

**EIMT30 - Electrical Install Theory I**
• Design and calculate the electrical requirements for a specific residential building with emphasis on the National Electrical Code and principles of residential blueprint reading.

**EIMT32 - Electrical Installation I**
• Analyze the operation of single-pole, three-way, four-way, and double-pole single throw switches.
• Analyze troubleshooting tasks, using a neon voltage tester.
• Apply the National Electrical Code (NEC).
• Explain the installation requirements for non-metallic sheathed cable, according to the NEC.
• Explain the NEC installation of armored cable.
• Identify electrical fittings and devices.
• Identify single-pole, three-way, four-way and double-pole single throw switches.
• Install a door chime.
• Install a low-voltage lighting circuit.
• Install a telephone outlet.
• Install and test smoke detectors.
• Install dryer outlets.
• Install range outlets.
• Install various types of armored cable circuits.
• Install various types of dimmer controlled lighting circuits.
• Install various types of dwelling electrical service equipment.
• Install various types of electrical devices.
• Install various types of fluorescent lighting circuits.
• Install various types of four-way lighting circuits.
• Install various types of Ground-Fault Circuit-Interrupter circuits.
• Install various types of lighting and receptacle combination circuits.
• Install various types of pilot light lighting circuits.
• Install various types of receptacle circuits.
• Install various types of single-pole lighting circuits.
• Install various types of three-way lighting circuits.
• Install various types of time clock circuits.
• Perform safety rules.
• Terminate a coaxial cable with female fitting.

**EIMT40 - Electrical Install Theory II**
• Design and calculate the electrical requirements for a specific commercial building with emphasis on the National Electrical Code and principles of commercial blueprint reading.

**EIMT42 - Electrical Installation II**
• Design, calculate, troubleshoot, and using various types of cable and raceway systems, install various types of lighting, motor, and transformer branch circuits within a specific commercial building with emphasis on the National Electrical Code and principles of commercial blueprint reading.

**EIMT44 - AC/DC Systems and Equipment**
• Analyze insulation test graphs.
• Calculate gear reducer outputs.
• Calculate motor locked rotor current.
• Calculate pulley sizes.
• Define single-phase motor terms.
• Define three-phase motor terms.
• Demonstrate honesty.
• Determine capacitor ratings.
• Determine motor dimensions.
• Determine overload trip time.
• Determine temperature corrected overload protection.
• Display dependability.
• Draw control transformer connection diagrams.
• Draw manual motor starter schematic diagrams.
• Draw single-phase motor connections.
• Draw three-phase motor connections.
• Evaluate motor working conditions.
• Explain across-the-line magnetic starter construction.
• Explain across-the-line magnetic starter operating principles.
• Explain contactor operation.
• Explain control station operation.
• Explain general motor maintenance.
• Explain Hand-Off-Auto wiring diagrams.
• Explain magnetic clutches.
• Explain magnetic drives.
• Explain manual motor starter diagrams.
• Explain manual motor starter operating principles.
• Explain motor overload relay operating principles.
• Explain motor selection criteria.
• Explain motor starting equipment selection factors.
• Explain motor torque-speed curve.
• Explain multiple push-button station wiring diagrams.
• Explain pilot device operating principles.
• Explain relay operation.
• Explain reversing starter interlocking methods.
• Explain schematic (elementary) diagrams.
• Explain single-phase motor operation.
• Explain single-phase motor testing.
• Explain three-phase motor operation.
• Explain three-wire control circuit operation.
• Explain timing relay operation.
• Explain two-wire control circuit operation.
• Explain wiring diagrams.
• Identify and draw NEMA symbols.
• Identify single-phase motor terminals.
• Interpret anti-plugging control diagrams.
• Interpret autotransformer starter diagrams.
• Interpret jogging control diagrams.
• Interpret plugging control diagrams.
• Interpret primary resistor starter diagrams.
• Interpret reversing starter diagrams.
• Interpret sequence control diagrams.
• Interpret single-phase motor tests.
• Interpret star-delta starter diagrams.
• Interpret thermal switch tests.
• Interpret three-phase motor tests.
• Interpret wound rotor motor starter diagrams.
• List typical motor starting methods.
• Organize work.
• Select motor running overload protection.
• Select motor starting protection.
• State causes of single-phase motor failure.
• State causes of three-phase motor failure.
• State general motor control principles.
• State new capacitor specifications.
• Use resistor color code.

EIMT46 - Elec Maintenance & Repair
• Calculate single-phase motor slip.
• Calculate three-phase motor slip.
• Clean a single-phase motor.
• Clean a three-phase motor.
• Complete a single-phase motor service report.
• Complete a three-phase motor service report.
• Connect a automatic tank level control wiring diagram.
• Connect a high-pressure alarm wiring diagram.
• Connect a high-pressure annunciator wiring diagram.
• Connect a jogging control wiring diagram.
• Connect a multiple pushbutton station wiring diagram.
• Connect a reversing starter wiring diagram.
• Connect a single-phase dual voltage motor.
• Connect a tank level annunciator wiring diagram.
• Connect a three-phase dual voltage motor.
• Connect a three-phase manual motor starter.
• Connect a three-wire control magnetic motor starter.
• Connect a three-wire control wiring diagram.
• Connect a two-wire control magnetic motor starter.
• Demonstrate chemical safety.
• Demonstrate honesty.
• Design a five motor control circuit.
• Design a five motor conveyor control circuit.
• Design a four motor control circuit.
• Design a machine tool control circuit.
• Design a material processing drive control circuit.
• Design a three motor control circuit.
• Design a two motor control circuit.
• Design a two motor conveyor control circuit.
• disassemble a single-phase motor.
• Disassemble a three-phase motor.
• Display dependability.
• Encourage cooperation.
• Exhibit safe work practices.
• Inspect a single-phase motor.
• Inspect a three-phase motor.
• Install wire lugs.
• Insulate three-phase motor windings.
• Measure single-phase motor current.
• Measure single-phase motor speed.
• Measure three-phase motor current.
• Measure three-phase motor speed.
• Perform single-phase motor final tests.
• Perform single-phase motor preliminary tests.
• Perform three-phase motor final tests.
• Perform three-phase motor preliminary tests.
• Reassemble a single-phase motor.
• Reassemble a three-phase motor.
• Replace a single-phase motor starting switch.
• Replace single-phase motor bearings.
• Replace three-phase motor bearings.
• Reverse a single-phase dual voltage motor.
• Reverse a three-phase dual voltage motor.
• Show initiative.
• Test single-phase motor capacitor condition.
• Troubleshoot a basic circuit - 8 advanced faults.
• Troubleshoot a basic circuit - 8 basic faults.
• Troubleshoot a basic control circuit - 4 genius faults.
• Troubleshoot a basic control circuit - 8 advanced faults.
• Troubleshoot a basic control circuit - 8 basic faults.
• Troubleshoot a basic control circuit - 8 intermediate faults.
• Troubleshoot a motor control circuit - 8 advanced faults.
• Troubleshoot a motor control circuit - 8 basic faults.
• Troubleshoot a motor control circuit - 8 intermediate faults.
• Use common sense.
• Wire a auxiliary contact interlock reversing starter control circuit.
• Wire a compelling relay pushbutton control circuit.
• Wire a forward-reverse jogging control circuit.
• Wire a Hand-Off-Auto control circuit.
• Wire a pushbutton interlock reversing control circuit.
• Wire a sequence control circuit.
• Wire a Star-Delta starter control circuit.
• Wire a start-stop-jog control circuit using two-position selector switch.
• Wire a start-stop-jog control circuit.
• Wire a start-stop-jog relay controlled circuit.
• Wire a three-speed pushbutton control circuit.
• Wire a three-wire control circuit.
• Wire a timed plugging control circuit.
• Wire a two motor control circuit.
• Wire a two motor control time delay circuit.
• Wire a two motor starter control circuit with time delay on Start and Stop.
• Wire a two pushbutton station control circuit.
• Wire a two step timed acceleration control circuit.
• Wire a two-wire control circuit.

EIMT50 - Solid State Control
• Analyze capacitor filtering.
• Analyze diode circuits.
• Analyze SCR applications.
• Analyze zener diode applications.
• Assess SCR cooling.
• Assess transistor power dissipation.
• Calculate rectifier output voltage.
• Classify photoelectric transducers.
• Compare PLC and relay control circuits.
• Define PLC terms.
• Describe basic PLC operation.
• Describe PC board construction.
• Describe rectifier testing.
• Describe SCR mounting.
• Describe SCR operation.
• Describe thermistor operation.
• Describe triac operation.
• Diagram PLC scan.
• Diagram transistor biasing.
• Diagram voltage dividers.
• Explain basic data moves and arithmetic functions.
• Explain basic PLC applications.
• Explain bit sequencer circuits.
• Explain counter circuits.
• Explain diac operation.
• Explain diode installation.
• Explain full-wave bridge rectifier operation.
• Explain full-wave rectifier operation.
• Explain half-wave rectifier operation.
• Explain jump circuit.
• Explain liquid crystal display (LCD) operation.
• Explain master control relay circuits.
• Explain PC board repair.
• Explain relational functions.
• Explain retentive circuits.
• Explain SCR construction.
• Explain sealing circuits.
• Explain semiconductor construction.
• Explain timer circuits.
• Explain transistor basics.
• Explain ULT operation.
• Explain variable declarations.
• Explain voltage regulation.
• Explain zener diode ratings.
• Identify diode terminals.
• Interpret basic PLC ladder diagrams.
• Interpret diode tests.
• Interpret SCR tests.
• Interpret transistor characteristic curves.
• Interpret transistor tests.
• List light emitting diode (LED) applications.
• List PLC advantages.
• List PLC applications.
• List PLC input devices.
• List PLC output devices.
• Perform AC value mathematical conversions.
• State diode operating characteristics.
• State Hall effect applications.
• State workplace safety practices.
• State zener diode operation.
EIMT52 - Solid State Control Lab

• Apply resistor color code.
• Assemble full-wave bridge rectifier.
• Assemble full-wave rectifier.
• Assemble half-wave rectifier.
• Assemble light controlled transistor switch circuit.
• Assemble photocell transistor controlled relay circuit.
• Assemble rectifier ripple filter circuits.
• Assemble SCR annunciator circuit.
• Assemble SCR trigger circuit.
• Assemble shunt voltage regulator.
• Assemble simple SCR alarm circuit.
• Assemble transistor switch circuit.
• Assemble transistor timed switch circuit.
• Assemble UJT circuit.
• Assemble UJT relaxation oscillator.
• Assemble UJT trigger circuit.
• Calculate percentage of voltage regulation.
• Calculate ripple factor.
• Configure a GE Series 90-30 PLC.
• Construct germanium diode characteristic curve.
• Construct silicon diode characteristic curve.
• Construct transistor power dissipation curve.
• Construct zener diode characteristic curve.
• Determine SCR gate firing current.
• Enter GE Series 90-30 variable declarations.
• Exhibit basic electrical safety practices.
• Exhibit electrical safety equipment inspection procedures.
• Explain basic PLC operation.
• Explain PN semiconductor construction.
• Identify symbols.
• Identify transistor leads.
• Inventory trainer.
• Ise equipment Lock Out procedure.
• Measure transistor current.
• Operate oscilloscope.
• Program Baldor Series 10 inverter.
• Program GE Series 90-30 basic relay circuits.
• Program GE Series 90-30 bit sequencer function.
• Program GE Series 90-30 counter circuits.
• Program GE Series 90-30 data moves and arithmetic functions.
• Program GE Series 90-30 jump function.
Fire and Environmental Emergency Response

**Fire and Environmental Emergency Response**

- Demonstrate knowledge and skills required to respond appropriately to fire, medical, and environmental emergency situations at the private, city, state, or federal level.

**CLO**

**FIRE100 - Intro to Fire Protections**

- Analyze the basic components of fire as a chemical chain reaction, the major phases of fire, and examine the main factors that influence fire spread and fire behavior.

- Compare and contrast effective management concepts for various emergency situations.

- Define the role of national, state and local support organizations in fire and emergency services.

- Describe the common types of fire and emergency service facilities, equipment, and apparatus.

- Describe the importance of wellness and fitness as it relates to emergency services.

- Differentiate between fire service training and education and explain the value of higher education to the professionalism of the fire service.

- Discuss and describe the scope, purpose, and organizational structure of fire and emergency services.

- Identify fire protection and emergency service careers in both the public and private sector.

- Identify the primary responsibilities of fire prevention personnel including, code enforcement, public information, and public and private protection systems.

- Illustrate and explain the history of the fire service.

- List and describe the major organizations that provide emergency fire emergency response service and illustrate how they interrelate.

- Recognize the components of career preparation and goal setting.
FIRE102 - Fundamentals of Fire Prevention
- Define the national fire problems and fire prevention functions, including by relevant organizations, associations, and bureaus.
- Define, laws, rules, regulations, codes, and jurisdiction authorities that are relevant to fire prevention.
- Describe inspection practices and procedures.
- Describe the history and philosophy of fire prevention.
- Identify and describe the standards for professional qualifications for Fire Marshal, Plans Examiner, Fire Inspector, Fire and Life Safety Educator, as well as Fire Investigator.
- List opportunities in professional development for fire prevention personnel.

FIRE104 - Fire Inspector I
- Define and discuss fire prevention resources and agency responsibilities.
- Define and discuss the history of protection.
- Define and review property loss statistics.
- Discuss development and enforcement of fire prevention laws and regulations.
- Discuss fire prevention functions.
- Discuss general public fire education.
- Discuss investigating fire and fire brigades.
- Discuss responsibility of state fire marshals, local fire departments, and property owners.

FIRE107 - Fire Fighting Tactics & Strat
- Compare an approved plan to an existing fire protection system, given approved plans and field observations, so that any modifications to the system are identified, documented, and reported in accordance with the policies of the jurisdiction.
- Compute the allowable occupant load of a single-use occupancy or portion thereof, given a detailed description of the occupancy, so that the calculated allowable occupant load is established in accordance with applicable codes and standards.
- Determine code compliance, given the codes, standards, and policies of the jurisdiction and a fire protection issue, so that the applicable codes, standards, and policies are identified and compliance determined.
- Determine the operational readiness of existing fire detection and alarm systems, given test documentation and field observations, so that the systems are in an operational state, maintenance is documented, and all deficiencies are identified, documented, and reported in accordance with the policies of the jurisdiction.
- Determine the operational readiness of existing fire detection and alarm systems, given test documentation and field observations, so that the systems are in an operational state, maintenance is documented, and all deficiencies are identified, documented, and reported in accordance with the policies of the jurisdiction.
- Identify the applicable code or standard, given a fire protection, fire prevention, or life safety issue, so that the applicable document, edition, and section are referenced.
- Identify the occupancy classification of a single-use occupancy, given a description of the occupancy and its use, so that an accurate classification is made according to the applicable codes and standards.
- Inspect emergency access for an existing site, given field observations, so that the required access for emergency responders is maintained or so that deficiencies are identified, documented, and reported in accordance with the policies of the jurisdiction.
- Inspect means of egress elements, given observations made during a field inspection of an existing building, so that means of egress elements are maintained in compliance with applicable codes and standards and all deficiencies are identified, documented, and reported in accordance with the policies of the jurisdiction.
- Investigate common complaints, given a reported situation or condition, so that complaint information is recorded, the AHJ-approved process is initiated, and the complaint is resolved.
- Participate in legal proceedings, given the findings of a field inspection or a complaint and consultation with legal counsel, so that all information is presented accurately and the inspector's demeanor is professional.
- Prepare inspection reports, given observations from a field inspection, so that the report is clear and concise and accurately reflects the findings of the inspection in accordance with applicable codes and standards.
- Recognize a hazardous fire growth potential in a building or space, given field observations, so that the hazardous conditions are identified, documented, and reported in accordance with the policies of the jurisdiction.
- Recognize hazardous conditions involving equipment, processes, and operations, given field observations, so that the equipment, processes, or operations are conducted and maintained in accordance with applicable codes and standards and all deficiencies are identified, documented, and reported in accordance with the policies of the jurisdiction.
- Recognize the need for a permit, given a situation or condition, so that requirements for permits are communicated in accordance with the
• Recognize the need for plan review, given a situation or condition, so that requirements for plan reviews are communicated in accordance with the policies of the jurisdiction.

• Verify code compliance for incidental storage, handling, and use of flammable and combustible liquids and gases, given field observations and inspection guidelines from the authority having jurisdiction, so that applicable codes and standards are addressed and all deficiencies are identified, documented, and reported in accordance with the policies of the jurisdiction.

• Verify code compliance for incidental storage, handling, and use of hazardous materials, given field observations, so that applicable codes and standards for each hazardous material encountered are addressed and all deficiencies are identified, documented, and reported in accordance with the policies of the jurisdiction.

• Verify fire flows for a site, given fire flow test results and water supply data, so that required fire flows are in accordance with applicable codes and standards and all deficiencies are identified, documented, and reported in accordance with the policies of the jurisdiction.

• Verify that emergency planning and preparedness measures are in place and have been practiced, given field observations, copies of emergency plans, and records of exercises, so that plans are prepared and exercises have been performed in accordance with applicable codes and standards and all deficiencies are identified, documented, and reported in accordance with the policies of the jurisdiction.

• Verify the type of construction for an addition or remodeling project, given field observations or a description of the project and the materials being used, so that the construction type is classified and recorded in accordance with the applicable codes and standards and the policies of the jurisdiction.

FIRE108 - Wellness/Fitness for Emer Resp
• Define the term wellness and its relationship to health and disease.

• Define wellness/fitness related to health and disease for Emergency Response Personnel including major causes of injury/death for firefighters and the associated risk/reduction factors.

• Design and implement a personal Wellness/Fitness program.

• Explain the components of Wellness/Fitness and how to assess them (Warm up, Functional Exercises for every major body part, Cool down, Nutrition, Sustainability and Stress management).

• Prepare for the Candidate Physical Ability Test (CPAT).

• Prepare for the NASM Certified Personal Trainer Exam.

FIRE111 - Management in the Fire Service
• Identify property and life loss statistics created by fire.

• Identify the steps in commanding an Incident.

• Identify the various types of fire budgets.

FIRE115 - Fire Apparatus & Equipment
• Analyze problems associated with water supply systems.

• Calculate pressure loss.

• Describe and document apparatus testing.

• Describe emergency vehicle operation and regulations.

• Describe fire pump operation.

• Describe foam equipment and operations.

• Describe positioning of fire apparatus.

• Distinguish characteristics of fire pumpers.

• Identify and describe fire pump operations, controls and instruments.

• Identify nozzles and their flow rates.

• Outline relay pumping operations.

• Outline water shuttle operations.

• Perform and document inspection of apparatus.

• Perform fireground hydraulic calculations.

• Recognize, access, and pump from a static water supply source.

FIRE117 - Basic Rescue in the Fire Srvce
• Define environmental hypothermia.

• Demonstrate how to secure a patient with spine, pelvis, or lower extremity injuries.
• Demonstrate splinting for fractures.
• Describe diving medical emergencies.
• Describe Ground Vehicle Transportation, aerial Medical Evacuation," and Personnel safety packaging for aero medical evacuation.
• Describe how to gain access in an urban setting.
• Describe psychological stress.
• Describe the hazards in confined spaces.
• Describe the indications and treatment of common medical condition and injuries.
• Describe the indications and treatment of environmental specific medical conditions and injuries.
• Describe the managing of injured or ill patients and explain the contamination control during transport.
• Describe the medical care in the rescue setting.
• Describe the patient assessment system.
• Describe the physical and psychological hazards.
• Describe water searches: initial actions, strategy, and tactics.
• Discuss confined spaces.
• Discuss generic initial response actions.
• Discuss hazardous material.
• Discuss patient assessment in rescue medical care.
• Discuss resource tracking systems.
• Discuss special patient treatment and packaging considerations.
• Discuss the communications for rescuer emergency care.
• Discuss the Incident command System.
• Discuss the physical threats to survival.
• Explain collapsed structure and debris searches.
• Explain how to gain access in remote areas.
• Explain ice rescue techniques.
• Explain mechanize environment access.
• Explain patient packaging and Litter evacuation.
• Explain technological and man-made disaster.
• Explain the "big net" principles.
• Explain the dangers from hazardous material.
• Explain the phases of fires.
• Give examples of rescuer hazards during fires.
• Identify and explain the types of wounds.
• Identify and recognize the protective clothing for the rescuer.
• Identify hazardous materials and danger zones.
• Identify the tools and give examples of techniques for a rescue.
• Know the rescue functions under the ICS System.
• Organize and manage the Rescue Effort.
• Recognize fire hazards.

FIRE119B - Emergncy Med Tech Part A
• Assess, manage, and stabilize patients of all ages and demographics with medical emergencies.
• Assess, manage, and stabilize patients of all ages and demographics with traumatic injuries.
• Demonstrate the ability to assist patients with their own prescribed medications.
• Demonstrate the ability to complete a patient care report, including a summation of treatment provided to the receiving facility or transporting ambulance.

• Demonstrate the ability to interact with other responders appropriately, including giving and receiving advice related to patient care. Interact as a member of a team.
• Demonstrate the ability to properly prepare the patient for transport while limiting or aggravating any injuries.
• Demonstrate the knowledge of triage and assigning patients to the appropriate receiving facility.
• Demonstrate the proper technique of donning and doffing protective gear appropriate for the EMT and situation.
• Perform basic airway management techniques including insertion of adjuncts intended to go into the oropharynx or nasopharynx.
• Perform cardiopulmonary resuscitation (CPR), both one and two person for the adult, child, and infant to the Healthcare Provider standards of the American Heart Association.

FIRE119C - Emergency Med Tech Part B
• Assess, manage, and stabilize patients of all ages and demographics with traumatic injuries.
• Demonstrate the ability to assist patients with their own prescribed medications.
• Demonstrate the ability to complete a patient care report, including a summation of treatment provided to the receiving facility or transporting ambulance.

• Demonstrate the ability to interact with other responders appropriately, including giving and receiving advice related to patient care. Interact as a member of a team.
• Demonstrate the ability to properly prepare the patient for transport while limiting or aggravating any injuries.
• Demonstrate the knowledge of triage and assigning patients to the appropriate receiving facility.
• Demonstrate the proper technique of donning and doffing protective gear appropriate for the EMT and situation.
• Perform basic airway management techniques including insertion of adjuncts intended to go into the oropharynx or nasopharynx.
• Perform cardiopulmonary resuscitation (CPR), both one and two person for the adult, child, and infant to the Healthcare Provider standards of the American Heart Association.

FIRE123 - Fire Investigation
• Describe the basics of electricity and determining the electrical causes of fire.
• Describe the combustion properties of liquid and gaseous fuels.
• Describe the combustion properties of solid fuels.
• Describe the different motives for the crime of arson.
• Describe the elementary chemistry of combustion.
• Describe the function of evidence gathering and use of laboratory services to evaluate evidence.
• Describe the nature and behavior of fire.
• Describe the process of investigating automobile, motor vehicle, and ship fires.
• Describe the process of investigating fire-related deaths and injuries.
• Describe the process of investigating grass and wildland fires.
• Describe the process of investigating structure fires.
• Describe the properties of chemical fires and hazardous materials.
• Describe the properties of clothing and fabric fires.
• Describe the properties of explosive combustion and explosives.
• Describe the various sources of ignition related to arson.
• Have a conceptual knowledge of arson scene safety, fire modeling, arson law, elements of proof, chain of evidence, report writing, and courtroom testimony.

• Identify the arson problem in the United States.

FIRE126 - Legal Aspects of Emergency Ser
• Define the different types of laws.
• Discuss applicable court decisions that have influenced emergency services.
• Discuss federal, state, and local laws and liabilities applicable to emergency services.
• Explain the purpose of national codes and standards.
• Recognize the legal issues and concerns affecting emergency services.

FIRE150 - Industrial Fire Protection
• Determine occupancy classifications and fire protection needs for various occupancies and processes.
• Discuss considerations for safe egress from various occupancies.
• Explain the relationship between building systems and fire protection as well as advantages/disadvantages of each protection system.
• Identify HIOSH requirements on fire safety.
• Perform a basic fire safety inspection.

FIRE151 - Intro Wild Land Fire Control
• Demonstrate how to use and carry cutting tools used for wildland fire suppression.
• Demonstrate the assembly, use, maintenance, and storage of portable pumps with 100 accuracy.
• Deploy both the current GSA Fire Shelter and the New Generation Fire Shelters within 25 seconds.
• Explain the importance and demonstrate proper mop-up procedures.
• Explain the proper care, use and limitations of wildland fire PPE.
• Identify and how to implement the 10 Standard Firefighting Orders and 18 Watch Out Situations.
• Identify commonly used cutting tools, proper PPE, proper maintenance, and proper sharpening techniques.
• Identify current and expected parameters affecting wildland fire behavior.
• Identify how to inspect, identify hazards, and use of a fusee and drip torch.
• Identify safety hazards when working around engines, dozers, and aircraft.
• Identify the parts of a wildland fire, the methods of attacking a fire, and the four kinds of control lines used during wildland fire suppression.
• Identify the principle environmental elements affecting wildland fire behavior.
• Identify the types of portable pumps used on wildland fires.
• Identify the wildland fire environment indicators that can produce problem and extreme fire behavior.
• Identify what Personal Protective Equipment (PPE) is required for wildland fire fighting.
• Properly describe items to watch for when traveling to, arriving at, and during initial attack that might show the origin and/or cause of the fire.
• Properly describe the steps necessary to protect cultural resources during wildland fire suppression operations.
• Properly explain the definition, and six clues for detecting the presence of hazardous materials.
• Recognize when and where to properly deploy a fire shelter.

FIRE152 - Wildland Fire Cntrl Field Meth
• Correctly demonstrate proper use of a compass, and how to determine latitude and longitude coordinates.
• Correctly describe the differences between a safety zone and a deployment zone.
• Correctly describe the steps required to properly size-up the fire situation upon arrival and throughout a fire assignment.
• Correctly discuss how atmospheric stability can change frequently and how to recognize both unstable and stable air mass.
• Correctly discuss how fuel characteristics and fuel moisture determine potential fire intensity and spread.
• Correctly identify a changing situation in the fire environment, and demonstrate the ability to modify tactics.
• Correctly identify deteriorating conditions in the fire environment and explain why an assignment cannot be safely completed.
• Correctly identify how to obtain and use information to determine the probable cause of a wildland fire including: obtaining information while traveling to a fire, locating and securing the probable ignition location, identifying witnesses, documenting any finding and presenting information to a wildland fire investigator.
• Correctly identify observable stages of fire behavior and how those observations may be used to help you predict or anticipate problem fire behavior.
• Correctly identify the What, Why and How of the Incident Command System to include the following: common terminology, management by objectives, unified command, incident action plan, and span of control.

• Correctly list the 7 fire environment factors to monitor on the fireline.

• Demonstrate the ability to utilize the Fireline Handbook and Incident Response Pocket Guide as fireline references, and demonstrate the ability to apply the information to given fire situations.

• Demonstrate the practical knowledge of portable pump operations to include: proper safety equipment, proper fuel mix, advantages and disadvantages of various pumps, and knowledge of water hydraulics.

• Identify and effectively utilize Lookouts, Communications, Escape Routes, and Safety Zones (LCES) during field operations.

• Identify human performance issues on the fireline so that individual firefighters can integrate more effectively into teams/crews working in dynamic, high risk environments.

• Identify human performance that relates to the individual, including situation awareness, communication, decision making, risk management, and teamwork skills.

• Properly demonstrate the assembly, utilization and disassembly of a portable pump.

• Properly describe the appropriate tactics to safely complete an assignment.

• Properly identify information which should be documented, and list ways to ensure communication is complete and accurate.

FIRE154 - Wildland Urb Interface Ops

• Describe 12 general safety considerations often encountered in interface operations.

• Describe how to prepare structures and the surrounding area to minimize damage, and firefighting methods employed to defend threatened structures from fire.

• Describe how you can minimize and protect against damage to public and private property.

• Identify four operations you should accomplish upon your arrival at the incident or assigned area, and describe their importance to your firefighting actions.

• Identify several important factors in dealing with the public at an interface fire, and the importance of an organized demobilization plan.

• Identify the three structure triage categories, and five basic factors upon which you base your triage decisions, and four conditions that may mean the situation is hopeless.

• List five items which would influence your resource order, and four subject areas to consider when briefing and deploying your resources.

• List several steps that should be completed before leaving an area involved in an interface fire.

• List the items that need to be considered in assessing the effectiveness of an action plan, and demonstrate your ability to properly update the action plan when the scenario changes.

• List the structural situations that shout "Watch Out" and seven don’t when working around power lines.

• List the three priorities when establishing strategic goals and three operational modes.

• List those items that should be included in a size-up report; to be considered in sizing-up an interface fire incident prior to and after arriving at the scene; and evaluating the types and limitations of resources needed.

FIRE156 - Wildland Incident Command

• At the completion of the course the students will utilize the ICS on several field exercises.

• Correctly describe proper terminology, organization structure, how the organization initially develops at an incident, how the organization expands or contracts, and transfer of command utilizing ICS principles.

• Correctly describe the history of the Incident Command System (ICS) to include: ICS positions compared to the old Large Fire Organization (LFO) positions, building the ICS organization, initial attack, mutual aid, task forces, strike teams, and expanding the ICS organization for extended attack.

• Correctly describe the major steps and the personnel involved in the planning process to include: support plans that may be required for some incidents including the communications, medical and demobilization plans.

• Correctly describe the principle facilities used in conjunction with ICS to include: command post, staging area, base camp, helibase, and helispot.

• Correctly describe the principles features which constitute the Incident Command System to include: the five primary functions, management by objectives, unity and chain of command, transfer of command, organization flexibility, unified command, span of control, common terminology, personnel accountability, integrated communications, resources management, and the incident action plan.

• Correctly describe ways in which incidents and events are organized to ensure achievement of incident objectives, and discuss the steps in organizational development that should take place on the incident.

• Correctly discuss the resource management process at an incident to include: the stages of resource management, responsibilities related to resource ordering, staging areas, demobilization of resources and considerations related to cost-effective resource management.

• Correctly discuss the resource status keeping function of descriptions of the kinds of resources often used, why resource status keeping is important, how resources are typed, three ways of using resources at an incident, resource status conditions, changing and maintaining status on resources.
• Correctly identify the common responsibilities associated with an ICS assignment to include: actions prior to an incident, incident check-in, while working at the incident, and during demobilization.

• Correctly identify the planning process, the development of incident objectives, strategies and tactics, the use of operational periods, and the planning meeting.

• Correctly provide a comprehensive description of the responsibilities of the organizational elements within each section of the ICS to include: the general duties of each organizational element, terminology, staffing considerations, and reporting relationships.

• Have an intermediate knowledge of the Incident Command System and demonstrate how to organize an incident of moderate complexity utilizing ICS.

FIRE157 - Inter Wildland Fire Behavior

• Compare and list the effects of daytime solar radiation and nighttime heat losses from various surfaces.

• Define moisture of extinction, how it varies in natural fuel complexes, and how it affects wildland fire ignition and spread.

• Define stable and unstable atmospheric conditions and explain their significance to wildland fire behavior.

• Define subsidence and describe two situations where it can increase wildland fire behavior.

• Define the difference between wind-driven and plume-dominated fires.

• Define the fuel moisture timelag concept and its value to firefighters and fire managers.

• Define the probability of ignition, describe its use, and determine it using tables.

• Define vortices, the conditions which contribute to their occurrence, and their implications to wildland fire behavior.

• Define wildland fire behavior characteristics that relate to fireline safety and tactics.

• Define wildland fire behavior in the third dimension and list four factors that are responsible for its occurrence.

• Demonstrate the use and maintenance of the belt weather kit in taking field weather observations.

• Describe common terms used in weather forecasting, including Lightning Activity Levels (LALs) and probably forecasts.

• Describe effective wind speed and explain how it is determined.

• Describe eight factors that contribute to the spotting problem.

• Describe foehn winds and list three reasons why they can lead to critical wildland fire weather patterns.

• Describe how air flows around high and low pressure systems.

• Describe how fuel moisture is determined for dead fuels in each of the four timelag categories.

• Describe how fuels availability is essential to predicting wildland fire behavior.

• Describe how rate of spread and flame length react to changes in fuels, fuel moisture, wind, and slope.

• Describe how the earth's surface and lower atmosphere warms and cools.

• Describe sea and land breezes and the processes that cause their occurrence.

• Describe the difference between general and spot forecasts and how each is obtained.

• Describe the effects of terrain, vegetation, clouds, and wind on temperature and relative humidity.

• Describe the fuel model concept and its utility for predicting wildland fire behavior.

• Describe the importance of having a field observer, weather observer, or other assigned person provide a lookout for potentially hazardous wildland fire behavior systems.

• Describe the relationship among atmospheric pressure, volume, and temperature.

• Describe the relationship among dry bulb temperature, dew point, wet bulb temperature, and relative humidity.

• Describe the relationships among relative humidity, wind, and moisture content of fine and large fuels.

• Describe the thermal belt and explain its significance on wildland fire behavior.

• Describe the three stages of crown fire development and the conditions under which they are likely to occur.

• Describe typical diurnal temperature and relative humidity changes.

• Determine fuel moisture contents for fine dead 1-hour timelag fuels from fuel moisture tables during daylight conditions.

• Determine relative humidity and dew point using appropriate psychrometric tables.

• Determine the stability or instability of the atmosphere based on visual indicators.

• Determine typical slope and valley winds during a 24-hour period using a topographic map.
• Discuss why there are daily and seasonal lags in temperature.
• Explain how the amount and duration of precipitation and soil moisture affect moisture content of fine and large fuels.
• Explain how thunderstorms can affect the wind in the wildland fire environment.
• Explain the change of the season.
• Explain the relationship among general, local, 20-foot, and mid-flame winds.
• Explain the significance of the earth's "heat balance".
• Have met the training required for S-290 Intermediate Wildland Fire Behavior
• Identify the fire environment's three major components: topography, fuel, and weather.
• Indicate the changes in wind that occur as a cold front moves through an area, and describe how these winds can change the spread of a wildland fire.
• Indicate the changes in wind that occur as a cold front moves through an area, and describe how these winds can change the spread of wildland fire.
• List and define by size class the four dead fuel time lag categories used to classify fuels.
• List and describe seven characteristics of fuels that affect wildland fire behavior.
• List and describe the four lifting processes that can cause thunderstorm development.
• List and describe the three stages of thunderstorms.
• List six types of clouds and describe their probable effect on fire weather.
• List the seven (7) wildland fire environment factors to monitor on the fireline.
• List the types of fire weather forecasts available.
• List three types of inversions and describe their effects on wildland fire behavior.
• List three ways topography can alter the speed and direction of the wind.
• List three weather patterns that warrant the issuance of either a Red Flag Watch or Warning.
• Name the five stages of vegetative development of live fuels, and give the average percent moisture content of each.
• Recognize the indicators of the seven (7) wildland fire environment factors.

FIRE202 - Fire Prot Hydr & Water Supp
• Analyze community fire flow demand criteria.
• Apply the application of mathematics and physics to the movement of water in fire suppression activities.
• Comprehend the design principles of fire service pumping apparatus.
• Demonstrate, through problem solving, a thorough understanding of the principles of forces that affect water at rest and in motion.

FIRE206 - Bldg Constr For Fire Protectio
• Analyze the hazards and tactical considerations associated with the various types of building construction.
• Classify major types of building construction.
• Classify occupancy designations of the building code.
• Demonstrate an understanding of building construction as it relates to firefighter safety building codes, fire prevention, code inspection and firefighting strategy and tactics.
• Differentiate between fire resistance and flame spread, and describe the testing procedures used to establish ratings for each.
• Explain the different loads and stresses that are placed on buildings and their interrelationships.
• Identify and analyze the causes involved in the line of duty firefighter deaths related to structural and wildland firefighting, training and research and the reduction of emergency risks and accidents.
• Identify the indicators of potential structural failure as they relate to firefighter safety.
• Identify the principle structural components of buildings and demonstrate an understanding of the functions of each.

FIRE207 - Haz Mat Awareness & Operations
• Define the role at a first responder.
• Demonstrate baseline knowledge of advanced operations to include tasks.
• Demonstrate familiarity of basic chemistry of hazardous materials.
• Describe hazards associated with each class of hazardous materials.
• Describe operation under Incident Command System.
• Identify hazardous materials.
• Operate safely and effectively at hazardous material incidents.

FIRE208 - Aircraft Rescue Fire Fighting
• Demonstrate mutual aid support personnel.
• Describe airport ground vehicle control.
• Describe Fire Extinguishers for maintenance operations.
• Describe Performance Objectives.
• Describe radio systems and their procedure.
• Describe the Aircraft Structural Material 22. Describe the Aircraft Systems.
• Describe the Module Content Introduction to structure and essential topics, theories, facts, concepts, requirements, equipment, and procedures.
• Describe the mutual aid assistance and communication.
• Describe the National Fire Code Objectives and Federal Aviation Regulation.
• Describe the Reinforce skills necessary to effectively operate local rescue firefighting equipment.
• Describe the types of aircraft incidents and accidents.
• Discuss Aircraft Types, Engines, and Systems.
• Discuss airport communications system, audible alarms, telephone systems.
• Discuss Airports.
• Discuss Fire Protection Systems and inflatable slide and emergency cut in areas.
• Discuss post incident operation.
• Discuss runways and taxiways designation systems 12. Identify the lighting and marking systems.
• Discuss the knowledge and skill levels required to perform aircraft crash and rescue duties.
• Discuss the State of Hawai‘i Airport Firefighters Certification Program.
• Discuss water and fuel supplies.
• Explain emergency response notification.
• Explain Fire and Rescue Communications.
• Explain Fire Prevention.
• Explain large fuel spills and fire extinguishers required for fueling.
• Explain pre- incident planning.
• Explain standardized coding, fuel systems, fuel tanks and distribution.
• Explain the Aircraft Rescue and Fire Fighting Procedures.
• Explain the care of the protective equipment.
• Explain the Personal Protective Equipment.
• Explain the procedures for a overheated landing gear, tire' and wheel failures, and low- impact crashes.
• Explain the proper usage of radio and telephone systems.
• Explain the purpose of Aircraft Crash and Rescue.
• Explain the three levels of difficulty for the knowledge and skill objectives.
• Identify different aircraft fuels.
• Identify investigative authorities.
• Identify possible accident sites.
• Identify the Engine Types and Applications.
• Identify the Types of aircrafts.
• Identify uniforms, hearing and eye protection, protective clothing, and self contained breathing apparatus.
• Illustrate record keeping and aircraft familiarization.
• Know evidence and property protection.
• Know how to monitor ground activity.
• Know life safety and property protection.

FIRE209 - Hazardous Materials Technician
• Analyze a hazardous material incident to determine the magnitude of the problem in terms of outcomes.
• Describe monitoring, decontamination, and personal protective equipment that is effective against these agents.
• Evaluate the planned response by evaluating the effectiveness of the control functions.
• Implement the planned response to favorably change the outcomes consistent with the organizations standard operating procedures and safety considerations.
• Plan a response within the capabilities of available personnel, personal protective equipment, and control equipment.
• Terminate the incident.
• Understand what weapons of mass destruction are and how to recognize them.

FIRE211 - Haz Materials Incident Mgt
• Define and explain key hazardous materials terms and principles.
• Describe procedures for conducting pre- and post-entry medical monitoring for response personnel operating at a hazardous materials incident.
• Describe the concept of hazard assessment and risk evaluation.
• Describe the Eight Step Process and its application as a tactical incident management tool for managing on-scene operations at a hazardous materials incident.
• Describe the principles of recognition, identification, classification, and verification as they apply to hazardous materials emergencies.
• Identify and describe the hazardous materials branch functions required to manage information at a hazardous materials incident.
• Identify steps for developing a plan of action for a hazardous materials incident.
• Identify the components of the Hazardous Materials Management System.
• Identify the duties and responsibilities of hazardous materials group functions with the Incident Command System.
• Identify the four levels of personal protective equipment worn at hazardous materials incidents.
• Identify the key organizational elements of the Incident Command System.
• Identify the physical and psychological stresses that can affect users of protective clothing.
• List key legislative, regulatory, and voluntary standards that impact hazardous materials emergency planning and response operations.
• List the categories of participants at a hazardous materials incident.

FIRE218 - Emerg Resp For Haz Materials
• Appropriately respond to hazardous material incidents.
• Correctly select, use, and maintain personal protective equipment.
• Describe operating modes, use, calibration, and limitations of monitoring instruments used in hazardous waste operations.
• Develop and implement a site-specific safety and health plan that includes appropriate spill containment and personnel decontamination.
• Recognize and assess hazards associated with hazardous waste operations and chemical emergency response.

FIRE280A - Firefighter I and II
• Apply fireground operations activities
• Demonstrate fire department communication procedures
• Employ fire prevention, preparedness, and maintenance activities
• Meet the general knowledge and skill requirements, and job performance requirements covered in NFPA 1001
• Perform rescue operations
FIRE280B - Firefighter I and II Lab
• Apply fireground operations activities
• Demonstrate fire department communication procedures
• Employ fire prevention, preparedness, and maintenance activities
• Meet the general knowledge and skill requirements, and job performance requirements covered in NFPA 1001
• Perform rescue operations

Occupational Environmental Safety Management

Occupational & Environmental Safety Management
• Analyze proximate and root causes of work-related accidents
• Conduct training and presentations on occupational/environmental safety & health topics
• Demonstrate necessary knowledge and skills for employment in the field of occupational and environmental safety and health
• Develop a written accident prevention and safety management program
• Exercise choices, explain reasons for choices, and analyze potential consequences when dealing with ethical dilemmas concerning health and safety professionals
• Identify and apply appropriate OSHA/HIOSH and EPA regulatory requirements
• Recognize and evaluate workplace and environmental hazards
• Recommend control measures and accident prevention strategies

CLO

OESM101 - Intro to Occup Safety & Health
• Assess the overall effects of workplace accidents and the benefit of preventing work-related accidents.
• Demonstrate an ability to work together through various group assignments.
• Discuss the roles of governmental agencies, businesses, and safety professionals in ensuring the safe and healthful work environment.
• Examine potential ethical issues for health and safety professionals.
• Identify and evaluate common work-related hazards as well as recommend appropriate control measures.

OESM102 - Standards and Codes
• Apply appropriate laws, rules, regulations and standards to reduce occupational injuries illnesses.
• Communicate information from laws, rules and standards to superiors, co-workers and subordinates.
• Explain the concepts of laws, rules, regulations, and standards.
• Identify and locate applicable safety and health standards.
• Reasonably and practically interpret laws, rules and standards.

OESM103 - Intro to Ergonomics
• Apply the NIOSH lifting guide and other guides developed to assess safe lifting limits.
• Conduct an ergonomics survey and recommend corrective actions to eliminate or minimize ergonomic injuries.
• Discuss the benefits of an effective ergonomics program in addressing work-related injuries.
• Identify OSHA’s and the safety community’s roles in reducing ergonomic injuries.
• Recognize the impact of poor ergonomics in the workplace.

OESM104 - Occupational-Related Diseases
• Apply an epidemiological approach to assess exposure pathways linking the job to an occupational disease.
• Describe etiology, body’s defense mechanisms, and common symptoms of major occupational diseases.
• Discuss effective medical surveillance methods.
• Discuss hazards causing major occupational diseases in the US and identify control measures to reduce workers’ exposures.
• Explain epidemiological study methods and identify each study design’s advantages/disadvantages.

OESM105 - Intro to Industrial Hygiene
• Apply the industrial hygiene principles to identify causes and recommend control measures.
• Compute relevant industrial hygiene parameters.
• Describe the key elements of an industrial hygiene program and explain their relationships to other aspects of a company’s overall safety program.

OESM106 - Intro to Environmental Health
• Assess U.S. environmental legislation and its significance to the human health.
• Demonstrate an ability to minimize health impacts from environmental pollutants through the use of prevention techniques and policies.
• Describe types of biological and chemical weapons and their potential for disease causation.
• Discuss the use of environmental epidemiology methodology to assess health risks.
• Recognize types, sources, pathways and adverse health effects of environmental pollutants.

OESM145 - Occ Safety & Hlth in Construct
• Analyze various construction situations to identify hazards and recommend preventive/corrective measures.
• Apply relevant HIOSH/OSHA construction standards to given construction scenarios.
• Design and conduct a “toolbox” safety meeting.
• Discuss major health and safety issues common to the construction work environments.
• Identify specific HIOSH/OSHA construction standards.

OESM147 - Electrical Safety
• Apply appropriate OSHA’s electrical standards.
• Conduct a safety inspection according to OSHA’s and consensus electrical standards utilizing basic electrical safety tools.
• Conduct an electrical safety training program.
• Discuss basic electrical theory.
• Identify electrical hazards and appropriate abatement techniques.

OESM150 - Industrial Fire Protection
• Determine occupancy classifications and fire protection needs for various occupancies and processes.
• Discuss considerations for safe egress from various occupancies.
• Explain the relationship between building systems and fire protection as well as advantages/disadvantages of each protection system.
• Identify HIOSH requirements on fire safety.
• Perform a basic fire safety inspection.

OESM153 - Accident Investigation Tech
• Apply various accident investigation techniques including the root cause analysis.
• Describe the accident investigation process.
• Develop a written comprehensive accident report.
• Develop and implement an accident investigation checklist.
• Discuss the importance of accident investigations and identifying root causes.

OESM160 - Labor & Mgmt: Safety Partners
• Analyze cases involving labor relations, work injuries, and safety/health practices.
• Analyze conflicting claims in laws and union contractual grievances and hearings, and provide advice, counsel, or testimony.
• Analyze current global events and controversies involving workers’ safety/ health, labor & environmental issues.
• Demonstrate conflict resolution, listening, and negotiation skills.
• Explain relevant Hawaii labor laws, their historical/cultural background, as well as management’s and labor’s roles (unions and/or workers) in addressing health and safety issues.
OESM200 - Managing Workers Compensation
• Apply techniques to combat workers’ compensation fraud.
• Describe the Workers’ Compensation system and functions of various officials involved in administering the system, including the claims coordinator.
• Develop a Modified Duty program.
• Discuss factors that influence workers’ compensation premiums and identify measures to avoid claims through safety management.
• Perform a workers’ compensation loss control survey.

OESM205 - Physical Hazards Controls
• Apply class materials to real-world environment via a Field Trip to Hawaiian Electric Co.
• Conduct hazard assessments to determine appropriate PPE.
• Describe accident prevention through design within common physical hazards including electrical safety, flammables and combustible liquids, fire protection systems, and lock out/tag out principals.
• Develop a safety inspection checklist, conduct an inspection, and present the findings as well as recommendations for hazard controls.
• Identify relevant regulatory requirements and consensus standards as well as governmental agencies responsible for workplace safety.

OESM208 - Tech of Industrial Hygiene
• Discuss appropriate industrial hygiene sampling and monitoring strategies.
• Evaluate hazardous conditions based on monitoring results.
• Explain uses and limitations of major industrial hygiene monitoring instruments.
• Identify situations where sampling and monitoring are needed to further evaluate workplace hazards.
• Select appropriate monitoring instruments and methods specific substances.

OESM210 - Safety Program Mgmt
• Conduct, document, and orally present a Job Safety Analysis (JSA).
• Develop a safety training plan and conduct the training.
• Devise an accident reduction plan that includes specific and measurable objectives.
• Examine techniques for measuring safety performance including both the leading and trailing indicators.
• Identify components of an effective safety management system.

OESM218 - Emergency Response for HazMat
• Appropriately respond to hazardous material incidents.
• Correctly select, use, and maintain personal protective equipment.
• Describe operating modes, use, calibration, and limitations of monitoring instruments used in hazardous waste operations.
• Develop and implement a site-specific safety and health plan that includes appropriate spill containment and personnel decontamination.
• Recognize and assess hazards associated with hazardous waste operations and chemical emergency response.

Refrigeration and Air Conditioning

Refrigeration & Air Conditioning Technology
• Demonstrate knowledge and skills required for the repair and maintenance of air conditioning and refrigeration equipment according to National Standards.
• Demonstrate positive work habits and attitudes.
• Gain employment in the field of refrigeration and air conditioning.

CLO

RAC21 - Basic Refrigeration
• Apply safety standards and work with technical developments in the industry.
• Demonstrate the ability to do technical work in a variety of heating, cooling, and refrigeration fields.
• Identify and demonstrate correct use of tools, materials, and equipment used in the trade.

RAC32 - Commercial Refrigeration
• Apply safety standards and work with technical developments in the industry.
• Demonstrate knowledge of basic electrical theory.
• Demonstrate skills needed to assemble a basic refrigeration system.
• Demonstrate the ability to do technical work in a variety of heating, cooling, and refrigeration fields.
• Perform basic system checks to make sure it is operating correctly and perform leak checks/repairs as necessary to eliminate leaks in the system.

RAC40 - Air Conditioning I
• Apply safety standards and work with technical developments in the industry.
• Demonstrate the ability to do technical work in a variety of heating, cooling and refrigeration fields.
• Identify and demonstrate correct use of tools, materials, and equipment used in the trade.
• Identify types of electric motors, state their typical applications, sketch a diagram showing how they are wired into circuits, evaluate a motor in a hermetic compressor to determine if it is electrically sound and safe to start.
• Identify, describe, and follow high- and low-voltage circuit of a typical electric air-conditioning system and its components.

RAC50 - Air Conditioning II
• Apply safety standards and work with technical developments in the industry.
• Determine proper charging procedures for various air conditioning systems and the setting of low pressure control for low-charge protection.
• Take wet- and dry-bulb temperature readings, determine relative humidity from the psychrometric chart, and use information to determine the level of comfort from the ASHRAE generalized comfort chart.
• Troubleshoot basic electrical and mechanical problems in a typical air conditioning system.

Sheet Metal and Plastics
Sheet Metal & Plastics Technology
• Explain the use of Short-cut layout methods and when they apply.
• Identify Air Conditioners ductwork fittings, their uses, the connection types, and their fabrication methods.
• Identify and install common fasteners used in sheet metal work.
• Identify and properly use personal safety equipment.
• Identify the base rules for order of operation in fabrication.
• Identify the different gauges of sheet metal, forming methods, and connection processes after layout.
• Identify the proper use, care and safety concerns of shop equipment.
• Layout, cut, notch, and bend in proper order, various fittings / components using sheet metal and plastic.
• Produce basic fitting layout using any of the three methods.
• Produce orthographic drawings for items requiring fabrication.
• Produce soldering joints on galvanized iron.
• Properly mix and apply acids used in soldering.
• Show proper use and care of sheet metal hand tools.
• State the three forms of metal fabrication.
• Understand the need for safety equipment in the shop & field.

CLO
SMP20 - Hand Tool & Machine Processes
• Identification and installation of common fasteners used in sheet metal work.
• Identify and properly use personal safety equipment.
• Identify the different gauges of sheet metal, forming methods, and connection processes after layout.
• Identify the proper use, care, and safety concerns of shop equipment.
• Show proper use and care of sheet metal hand tools.
• Understand the need for safety equipment in the shop & field.
SMP21 - Shop Problems
• Identify the base rules for order of operation in fabrication.
• Produce basic fitting layout using any of the three methods.
• Produce orthographic drawings for items requiring fabrication.
• State the three forms of metal fabrication.

SMP22 - Fabrication Process-Architect
• Identify and install common fasteners used in sheet metal work.
• Identify the base rules for order of operation in fabrication.
• Identify the different gauges of sheet metal, forming methods, and connection processes after layout.
• Layout, cut, notch, and bend in proper order, fittings and components used in sheet metal and plastic.
• Produce orthographic drawings for items requiring fabrication.
• Produce soldered joints on galvanized iron.
• Properly mix and apply acids used in soldering.

SMP23 - Intro to Surface Development
• Identify the base rules for order of operation in fabrication.
• Layout, cut, notch, and bend in proper order, fittings and components used in sheet metal and plastic.
• Produce basic fitting layout using any of the three methods.
• Produce orthographic drawings for items requiring fabrication.
• State the three forms of metal fabrication.

SMP24 - Adv Fabrication Process-Arch
• Identify and install common fasteners used in sheet metal work.
• Identify the base rules for order of operation in fabrication.
• Identify the different gauges of sheet metal, forming methods, and connection processes after layout.
• Layout, cut, notch, and bend in proper order, fittings and components used in sheet metal and plastic.
• Produce orthographic drawings for items requiring fabrication.
• Produce soldered joints on galvanized iron.
• Properly mix and apply acids used in soldering.
• Use SMACNA tables and charts to mathematically calculate component sizes.
• Use the Sheet Metal Workers Calculator for distance, area, volume and conversions.

SMP25 - Air Conditioning Fabrication
• Explain the use of short-cut layout methods and when they apply.
• Identify Air Conditioning ductwork fittings, their uses, the connection types, and their fabrication methods.
• Identify and properly use personal safety equipment.
• Identify the base rules for order of operation in fabrication.
• Identify the different gauges of sheet metal, forming methods, and connection processes after layout.
• Identify the proper use, care, and safety concerns of shop equipment.
• Layout, cut, notch, and bend in proper order, fittings and components used in sheet metal and plastic.
• Produce orthographic drawings for items requiring fabrication.
• Show proper use and care of sheet metal hand tools.
• Understand the need for safety equipment in the shop and field.

SMP26 - Pattern Development
• Explain the use of short-cut layout methods and when they apply.
• Identify and install common fasteners used in sheet metal work.
• Identify the base rules for order of operation in fabrication.
• Identify the proper use, care, and safety concerns of shop equipment.
• Layout, cut, notch, and bend in proper order, fittings and components used in sheet metal and plastic.
• Produce basic fitting layout using any of the three methods.
• Produce orthographic drawings for items requiring fabrication.
• Show proper use and care of sheet metal hand tools.
• State the three forms of metal fabrication.

SMP41 - Advan Air Condition Fabrication
• Have been introduced to the use of power equipment.
• Have developed skills in fabricating complex fittings using various types of seams and/or connections.
• Understand the theory and application of the use of various types of fittings for conventional A/C systems.

SMP43 - Pattern Development II
• Employ the application of the parallel line, radial line, and triangulation methods in developing patterns for fittings for conventional A/C systems.
• Select appropriate combinations of methods to produce correct patterns.

SMP44 - Blow Pipe Fabrication
• Fabricate and develop patterns for round work.
• Have developed the understanding of the technical data needed to design air conditioning and blow pipe systems.

SMP45 - Advanced Fabrication (General)
• Develop all patterns using standard shop procedure.
• Layout patterns on the metal emphasizing the (3) standard layout methods.

SMP46 - Pattern Development III
• Developed the learner’s ability to correctly interpret blueprints that deal with the sheet metal trade in building construction by stressing the application of mathematics and mechanical drawings.

SMP49 - Advanced Shop Problems
• Acquire extensive specialized knowledge and the latest methods employed by the sheet metal industry to solve the higher technological problems currently encountered by the modern sheet metal shop.
• Solve advanced shop problems related to sheet metal work through technical analyses and complex multi-faceted mathematical calculations.

Small Vessel Fabrication and Repair

PLO
No PLOs

CLO
No CLOs

Welding

Welding Technology
• Demonstrates competencies in manufacturing process development and design, production, maintenance installation and repair, supply chain logistics, quality assurance/continuous improvement and health and safety.
• Demonstrates competencies in SMAW, GMAW, FCAW, GTAW, thermal cutting, OFC, PAC, CAC and inspection.
• Demonstrates integrity, motivation, dependability and reliability and willingness to learn.
• Demonstrates knowledge in safety and health, drawing and symbols, Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Flux Cored Arc Welding (FCAW), Gas Tungsten Arc Welding (GTAW), Thermal Cutting, Oxygen Fuel Cutting (OFC), Plasma Arc Cutting (PAC), Carbon Arc Cutting (CAC) and Inspection.
• Demonstrates skills related to applied science, basic computers, applied mathematics/measurements, reading for information, business writing, listening and following directions, locating/using information and speaking/presentation.
• Demonstrates understanding of business fundamentals, teamwork, adaptability/flexibility, marketing and customer focus, planning and organizing, problem solving and decision-making and applied technology.
• Demonstrates welding fundamentals, processes and equipment, materials and metallurgy and welding safety.

**CLO**

**WELD16 - Welding for AMT Majors**
• Demonstrate basic use and operation of mig welding equipment according to industry standards.
• Demonstrate basic use of oxy-fuel welding and cutting according to industry standards.
• Select and use the proper safety clothing and equipment.

**WELD19 - Welding for Trades & Industry**
• Demonstrate basic use and operation of shielded metal arc welding equipment according to industry standards.
• Demonstrate basic use of oxy-fuel welding and cutting according to industry standards.
• Select and use the proper safety clothing and equipment.

**WELD21 - Hand and Shop Tools**
• Operate and maintain the drill press, band saw, abrasive sander, abrasive grinder, metal shears, hydraulic press, plasma cutter, and ironworker shearing machine.
• Select and use the proper safety clothing and equipment.
• Use various hand and measuring tools with proficiency.

**WELD52 - Intro to Arc Welding I**
• Demonstrate basic use and operation of shielded metal arc welding equipment according to industry standards in a flat position.
• Demonstrate basic use of oxy-fuel cutting according to industry standards.
• Select and use the proper safety clothing and equipment.

**WELD54 - Intro to Arc Welding II**
• Demonstrate basic use and operation of shielded metal arc welding equipment according to industry standards in the horizontal position.
• Select and use the proper safety clothing and equipment.

**WELD56 - Intro to Arc Welding III**
• Demonstrate basic use and operation of shielded metal arc welding equipment according to industry standards in the vertical position.
• Select and use the proper safety clothing and equipment.

**WELD58 - Intro to Arc Welding IV**
• Demonstrate basic use and operation of shielded metal arc welding equipment according to industry standards in the overhead position.
• Select and use the proper safety clothing and equipment.

**WELD60 - Advanced Arc Welding I**
• Demonstrate advanced use and operation of shielded metal arc welding equipment according to industry standards in the flat and horizontal positions on groove welds.
• Select and use the proper safety clothing and equipment.

**WELD62 - Advanced Arc Welding II**
• Demonstrate advanced use and operation of shielded metal arc welding equipment according to industry standards in the vertical position on groove welds.
• Select and use the proper safety clothing and equipment.

**WELD64 - Advanced Arc Welding III**
• Demonstrate advanced use and operation of shielded metal arc welding equipment according to industry standards in the overhead position on groove welds.
• Select and use the proper safety clothing and equipment.

**WELD66 - Plasma & Air Carbon Arc Cut**
• Demonstrate Care and use of plasma arc and air arc cutting process.
• Select and use the proper safety clothing and equipment.

**WELD68 - Blueprint Reading for Welders**
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Objectives</th>
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| WELD70      | Oxyacetylene Welding I                           | • Demonstrate proper use of terminology and symbols, blueprint reading and interpretation and sketching.  
• Select and use the proper safety clothing and equipment. |
| WELD72      | Oxyacetylene Welding II                          | • Demonstrate basic oxy-fuel welding techniques according to industry standards in the flat and horizontal positions.  
• Select and use the proper safety clothing and equipment.  |
| WELD74      | TIG Welding I                                    | • Demonstrate basic braze welding techniques according to industry standards in the flat and horizontal positions.  
• Select and use the proper safety clothing and equipment.  |
| WELD76      | TIG Welding II                                   | • Demonstrate basic braze welding techniques according to industry standards in the flat and horizontal positions.  
• Select and use the proper safety clothing and equipment.  |
| WELD78      | Fabrication Techniques                           | • Demonstrate basic oxy-fuel welding techniques according to industry standards in the flat and horizontal positions.  
• Select and use the proper safety clothing and equipment.  |
| WELD80      | Gas Metal & Flux Core Arc Weld                   | • Demonstrate basic oxy-fuel welding techniques according to industry standards in the flat and horizontal positions.  
• Select and use the proper safety clothing and equipment.  |
| WELD82      | Welding Inspection & Testing                     | • Demonstrate basic oxy-fuel welding techniques according to industry standards in the flat and horizontal positions.  
• Select and use the proper safety clothing and equipment.  |
| WELD84      | Advanced Fabrication Technique                   | • Demonstrate basic oxy-fuel welding techniques according to industry standards in the flat and horizontal positions.  
• Select and use the proper safety clothing and equipment.  |