



Approved Innovative Course

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Course: Occupational Safety and Environmental Technology (OSET) II

PEIMS Code: N1303681

Abbreviation: OSET2

Grade Level(s): 9-12

Number of Credits: 1.0

Course description:

During the Occupational Safety & Environmental Technology (OSET) II course, students will analyze the accident sequence, investigate hazard control concepts and principles, and examine fire protection systems and their applications with emphasis on the fire prevention codes and standards. Students will apply critical thinking skills to analyze system safety, organizational cultures, and the importance of leadership. Students will describe the organization of the accident investigation, from beginning to end. Students will examine analytical techniques in accident investigations and will utilize analytical investigation techniques to assist organizations in preventing accidents. Students will gain knowledge and skills necessary to make proactive hazard control an organizational priority.

The sequence of OSET courses provides students with the knowledge and skills to enter business and industry under OSET/OSHA. Students will be prepared to investigate hazards and create plans of action to address hazard controls for employers.

Essential knowledge and skills:

- (a) General Requirements: This course is recommended for students in Grades 10-12. Recommended prerequisite: OSET I.
- (b) Introduction.
 - (1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
 - (2) The Manufacturing Career Cluster focuses on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.
 - (3) Students investigate the field of Occupational Safety and Health Administration (OSHA), which is charged with the tasks of ensuring that businesses provide a safe workplace that is free from recognized hazards, promoting health and safety



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in the workplace, and reducing the occurrence of on the job injuries, illnesses, and fatalities. Students will use safety resources and discover procedures for collaborating with business and industry regarding ways to increase employee safety and health.

- (4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.
- (5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(c) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

- (A) identify career development and entrepreneurship opportunities in occupational safety and environmental technology;
- (B) identify careers in occupational safety and environmental technology;
- (C) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in occupational safety and environmental technology;
- (D) discuss certification opportunities;
- (E) identify employers' expectations, appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills; and
- (F) explore career goals, objectives, and strategies as part of a plan for future career opportunities.

(2) The student uses career planning concepts, tools, and strategies to explore careers in the accident investigations field. The student is expected to:

- (A) discuss the purpose and benefits of accident investigations to business and industry;
- (B) use verbal and written communication skills to create accident investigations reports;
- (C) compare roles and responsibilities and licensing and certification programs for various careers related to investigation and prevention of accidents; and



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- (D) report on and evaluate results related to potential employment opportunities in this career field.
- (3) The student uses effective communication processes. The student is expected to:
- (A) explain the communication process via written, spoken, or non-verbal means;
 - (B) analyze barriers to effective communication;
 - (C) organize information using a systematic process;
 - (D) describe the purpose behind what is being communicated;
 - (E) write an effective report, including a summary of incident, findings, and recommendations; and
 - (F) describe the effect that a lack of communication skills could have on efforts to control hazards.
- (4)The student demonstrates an understanding of the fundamental principles of hazard control plans. The student is expected to:
- (A) explain maintenance requirements for measurement tools used in collecting or evaluating environmental contaminants;
 - (B) identify various workplace hazards and unsafe behaviors;
 - (C) identify procedures to analyze and control hazards and unsafe operations or behaviors; and
 - (D) implement safe practices and methods for adhering to safe practices.
- (5)The student examines effective and safe working environments. The student is expected to:
- (A) explain the significance of periodic inspections for hazard control;
 - (B) compare various types of hazards, including biological, chemical, ergonomic, physical, and psychosocial;
 - (C) describe common factors among safe workplaces; and
 - (D) create effective check lists for inspection.
- (6) The student describes the steps to change analysis, which occurs when an investigator examines the unintentional changes that may have caused an accident. The student is expected to:
- (A) analyze a problem in a simulated or real work environment;



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- (B) establish what appropriate situation should have occurred;
 - (C) identify and describe the unintentional change;
 - (D) delineate what outcomes were affected by the change;
 - (E) specify individual aspects of the change; and
 - (F) describe possible causes for the change and choose the most likely cause(s).
- (7) The student demonstrates an understanding of the importance of personal protective equipment. The student is expected to:
- (A) discuss the purpose and benefit of protection of the body, including the eyes, face, head, feet, arms, hands and torso;
 - (B) discuss the role an employer plays in maintaining the proper maintenance and sanitation of protective devices;
 - (C) discuss the role an employer plays in training employees in the proper use of devices;
 - (D) understand the purpose of requiring annual safety certification by employers; and
 - (E) explain the role of a hazard control committee and its contribution to the success of hazard control in the workplace.
- (8) The student evaluates hazard control function effectiveness. The student is expected to:
- (A) discuss the significance of the hazard control audit for prevention purposes, rather than waiting for an injury analysis;
 - (B) describe the importance of reviewing plans, policies, and records of an organization;
 - (C) explain the rationale behind interviews, questionnaires, and observations of employees in the audit process;
 - (D) compare effective and ineffective hazard control indicators; and
 - (E) analyze hazard control effectiveness and describe ways in which it can be improved.
- (9) The student demonstrates an understanding of effective management and leadership in relationship to accident prevention efforts in an organization. The student is expected to:



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- (A) describe the main responsibilities of supervisors, managers, and members of an organization in the prevention of workplace hazards;
- (B) describe the characteristics of an effective leader in accident prevention efforts;
- (C) define organizational culture and its impact on accident prevention efforts; and
- (D) compare three management theories and their relationship to accident prevention.

(10) The student evaluates hazard control functions in varying organizational settings. The student is expected to:

- (A) identify preemptive actions that prevent or reduce slips, trips, and falls;
- (B) describe the importance of electrical safety and measures to reduce electrical hazards;
- (C) describe steps to reduce noise exposure;
- (D) summarize the noise reduction rating (NRR) as developed by the Environmental Protection Agency (EPA);
- (E) describe possible hazards related to heating, ventilation, and air conditioning systems;
- (F) describe possible hazards related to indoor air quality, including ventilation and adequate air flow;
- (G) identify steps to reduce hazards related to general machine and tool safety;
- (H) identify steps to reduce hazards related to powered industrial trucks; and
- (I) describe possible hazards related to ladders and scaffolds.

(11) The student demonstrates an understanding of hazardous materials management. The student is expected to:

- (A) describe ways in which hazardous materials can enter the body;
- (B) analyze the chemical concentration and exposure duration for various hazardous materials and the effects of exposure;



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- (C) compare ways to reduce exposure to hazardous chemicals or materials;
 - (D) explain various ways to protect from respiration of harmful airborne substances;
 - (E) describe the physical properties of hazardous materials;
 - (F) explain the purpose and importance of eye washes and emergency showers;
 - (G) explain the purpose and importance of proper chemical storage; and
 - (H) discuss the significance of compressed gas safety.
- (12) The student demonstrates an understanding of the OSHA hazard communication standard and OSHA requirements for organizations. The student is expected to:
- (A) develop and implement a hazard communication plan;
 - (B) describe the globally harmonized system of classification and labeling of chemicals;
 - (C) discuss the impact of the hazard communication standard changes on organizations;
 - (D) analyze and discuss safety data sheets and safety data sheet changes, including labeling requirements; and
 - (E) simulate employee training on OSHA standards.
- (13) The student analyzes different theories of accident investigation and determines which theory applies to accident investigation. The student is expected to:
- (A) compare accident investigation theories including Heinrich's Domino Theories and the Haddon Matrix Theory, among others;
 - (B) explain the Accident Ratio Study;
 - (C) analyze reports of small damage and near misses and describe future prevention of major accidents;
 - (D) explain the loss causation model;
 - (E) compare unsafe acts and unsafe conditions and the subsequent relationship to loss;
 - (F) identify effective questioning techniques when investigating causation;



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- (G) compare factors contributing to an investigation, including human factors, equipment factors, and environmental factors; and
- (H) apply accident causation theories to an accident.

(14) The student demonstrates an understanding of accident causation. The student is expected to:

- (A) compare various accident causation theories, including Multiple-Causation Theory and Biased-Liability Theory;
- (B) analyze human factors that lead to accidents, including poor judgment and memory lapse; and
- (C) explain common unsafe actions such as purposefully working at unsafe speeds or knowingly using unsafe tools.

(15) The student understands the process of accident reporting, accident investigations, and accident analysis. The student is expected to:

- (A) describe the importance of reporting an accident in a timely fashion;
- (B) analyze patterns or trends in accidents reported;
- (C) identify hazards, injuries, or accidents to be tracked;
- (D) explain the importance of maintaining records for data acquisition;
- (E) develop an accident report form;
- (F) develop a clear and concise process for completing an accident investigation and submitting an accident report;
- (G) identify and report causal factors;
- (H) analyze effective investigative techniques;
- (I) identify failures of management in an organization related to accident reporting;
- (J) describe the importance of accident analysis;
- (K) compare processes for accident analysis; and
- (L) evaluate accident report findings to create proper controls.

(16) The student describes how accidents can potentially impact an organization or workplace. The student is expected to:

- (A) analyze the benefits of organizational incentive programs for accident reporting;



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- (B) examine the financial impact on an organization related to the occurrence of accidents;
 - (C) identify systemic issues in a mock organization that may lead to accidents;
 - (D) discuss benefits of accident prevention, both financially and personally;
 - (E) explain legal compliance regarding accidents, including OSHA regulations and worker's compensation claims; and
 - (F) compare accident categorization including near miss, minor injury, major injury, and catastrophic injury.
- (17) The student explains various investigative techniques for accident investigation. The student is expected to:
- (A) describe the purpose of a formal written accident investigation policy;
 - (B) explain the facets of accident investigation training;
 - (C) describe the purpose of an accident investigation kit;
 - (D) describe the different types of evidence collected at the accident site, including physical evidence and photographic evidence;
 - (E) describe effective means of gathering evidence to properly investigate accidents;
 - (F) describe effective interview methods;
 - (G) describe effective methods of gathering photographic evidence;
 - (H) examine the role of the accident log, the accident form, and the accident report in accident investigation;
 - (I) simulate an interview with a witness to an accident; and
 - (J) simulate a list of evidence to be collected and photographs to be taken at a mock accident site.
- (18) The student uses an analytical approach to investigate accidents. The student is expected to:
- (A) describe the phases of an accident investigation;
 - (B) use a structured process to determine the accident sequence; and
 - (C) examine root causes and root cause analysis.



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- (19) The student analyses workplace procedures in response to accident investigations. The student is expected to:
- (A) describe various levels of accountability, including worker level and supervisor level accountability;
 - (B) compare and contrast hazards versus failures in an organization;
 - (C) discuss the benefits of using varying analytical techniques in accident investigations; and
 - (D) compare and contrast analytical techniques including events and causal factors analysis, change analysis, barrier analysis and free analysis.
- (20) The student demonstrates an understanding of accident prevention and the principle of an effective corrective action plan. The student is expected to:
- (A) describe the purpose of corrective actions;
 - (B) develop an effective corrective action plan for an organization;
 - (C) analyze the relationship between facts, analysis, and causation;
 - (D) describe the facets of hazard control precedence;
 - (E) analyze priorities in designing a hazard control solution;
 - (F) write a report documenting an accident;
 - (G) discuss the importance of corrective actions;
 - (H) delineate a time-table for an organization in following corrective actions;
 - (I) discuss the importance of follow-up activities for an organization; and
 - (J) discuss accident trending and its role in accident prevention.
- (21) The student explains the impact of fire safety and emergency management in relation to hazard control. The student is expected to:
- (A) describe the purpose and importance of a written fire prevention plan in the workplace;
 - (B) describe proper storage techniques for flammable or combustible materials;
 - (C) explain the stages of fire development;
 - (D) describe possible deficiencies in fire safety;



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- (E) describe general fire alarm requirements;
discuss the importance of fire systems inspections, fire confinement; and emergency exits and emergency lighting; and
- (F) describe the importance of portable fire extinguishers, including the maintenance of portable fire extinguishers.
- (22) The student identifies the relationship among fire behavior, the model codes, and the fire protection systems. The student is expected to:
- (A) describe the difference between fire and combustion, fire triangle and tetrahedron;
- (B) delineate and describe the types of fire and stages of fire;
- (C) describe the forms of heat transfer and methods used to extinguish fires;
- (D) describe the classes of fire and their relationship to extinguishing agents;
- (E) define the terms code and model code as described by the International Code Council (ICC) model code development process;
- (F) describe the difference between the ICC model code development process and the National Fire Protection Association (NFPA) model code development process;
- (G) describe the advantages to governments and organizations that adopt model codes; and
- (H) describe the most important code-related conditions that determine the installation requirements for fire protection systems.
- (23) The student examines various types and requirements of fire alarm system components and functions. The student is expected to:
- (A) identify and explain the fire alarm system components and functions and the types of fire alarms and detection systems; and
- (B) explain water supplies for fire protection systems, standpipe and hose systems, automatic fire sprinkler systems, and specialized water-based fire protection systems.
- (24) The student examines special hazard fire suppression systems. The student is expected to:



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- (A) describe the characteristics and hazards of fixed wet and dry chemical extinguishing systems, how they control and extinguish fire, and the periodic inspection requirements;
 - (B) describe the physical characteristics of carbon dioxide, halogenated hydrocarbons (halons), halocarbons, and inert gases (clean agents); and
 - (C) explain the fire extinguisher classification system, different types of fire extinguishers and how they operate, proper use of fire extinguishers, and the inspection, testing, and maintenance procedures.
- (25) The student recognizes communication skills needed for control and management systems, property security, and emergency response. The student is expected to:
- (A) use communication skills to state the design goals for smoke and fire control and smoke management systems during inspections;
 - (B) use interpersonal communication skills during emergency response training; and
 - (C) use writing skills to facilitate documentation requirements during inspections when identifying means of egress.

Description of specific student needs this course is designed to meet:

OSET II provides students the opportunity to graduate high school workforce ready in the Occupational Safety and Environmental Technology field. Students will gain the knowledge and skills to conduct safety audits and to prepare and present safety plans. The emphasis on science also exposes students to a broader STEM perspective, with an innovative view of environmental science and chemistry when dealing with potential hazards.

Major resources and materials:

Oakley, Jeffrey S. (2012). *Accident Investigation Techniques*. American Society of Safety Engineers.

Reese, Charles D. (2016). *Occupational Health and Safety Management: A Practical Approach*. CRC Press.

Recommended course activities:



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OSET students will assess industry regulations pertaining to manual material handling and storage; demonstrate knowledge of safe lifting work practices in industrial settings with written plans, establish precautions for working with toxic substance and apply industry related regulations (OSHA, DOT, EPS, CDC, FDA, etc.) to industrial workplace setting through written plans and reports.

Suggested methods for evaluating student outcomes:

Measures of success will be determined from daily participation, class work, projects, and exams.

Recommended educator certifications:

Secondary Industrial Arts: Grades 6-12

Secondary Industrial Technology: Grades 6-12

Technology Education: Grades 6-12

Trade and Industrial Education: Grades 6-12 with appropriate work approval as identified on the certificate

Trade and Industrial Education: Grades 8-12 with appropriate work approval as identified on the certificate

Vocational Trades and Industry. This assignment requires appropriate work approval.

Teacher qualifications:

Secondary Industrial Arts: Grades 6-12

Secondary Industrial Technology: Grades 6-12

Technology Education: Grades 6-12

Trade and Industrial Education: Grades 6-12 with appropriate work approval as identified on the certificate

Trade and Industrial Education: Grades 8-12 with appropriate work approval as identified on the certificate

Vocational Trades and Industry. This assignment requires appropriate work approval.

Additional information:

Students will have the opportunity to earn the ten-hour general industry OSHA certification in addition to dual credit towards a level I or level II certification and even an associate's degree if partnering with an institution of higher education with an OSET or OSHA program.