Syllabus

Principles of Industrial Hygiene 11:375:434

Instructor

Gary Schwartz, email address: garyschwartz18@gmail.com

Course Description

Principles of Industrial Hygiene provides an introduction to the field of industrial hygiene and to occupational health in general. The instructor focuses on introducing concepts, terminology, and methodology in the practice of industrial hygiene and identifies resource materials. The class would benefit those wishing to pursue a Master's degree in industrial hygiene; those interested in the industrial hygiene, environmental health or safety professional careers, or for students in allied health fields needing a basic understanding of industrial hygiene.

Text

Latest edition of TLVs and BEIs, American Conference of Industrial Hygienists, Signature Publications. Tel. # 513-742-2020 or www.acgih.org. Recommended but not required resource: Fundamentals of Industrial Hygiene (5th edition), National Safety Council Chicago, IL, 5th edition or most current available.

Grading system

Quiz, mid-term exam, final exam and participation in various homework assignments, hands-on exercises and drills.

Course Objectives

Upon completion of this course, you should be able to:

- Describe the legal, professional, and ethical framework for the practice of industrial hygiene.
- Define basic terms and technical concepts integral to the practice of industrial hygiene.
- Explain the differences between chemical (gases/vapors, dusts/mists/fumes), physical, and biological agents in the workplace.
- Calculate time-weighted averages.
- Convert between various units of exposure (for example, mg/m3 to ppm).
- Calculate and interpret noise exposures and doses.
- Identify the basic concepts of workplace exposure assessment.
- Describe the hierarchy of controls and how it applies to hazard control.

- Integrate various concepts into a broader occupational/ environmental health practice.
- Provide a basis for advanced course work in occupational safety and health.

Course agenda

Topic
Overview of Course, Introduction & Overview of Industrial Hygiene/Safety, HAZWOPER and Industrial Processes, Anatomy, Physiology and Toxicology (Lung-Inhalation route of exposure)
Toxicology (continue with inhalation, skin, eye hazards and associated health haz
Chemical Hazards-Recognition of hazards for gases, vapors, solvents & Particulate, Gas and Vapor Monitoring (hands-on workshop)
Particulate, Gas and Vapor Monitoring (hands-on workshop)
ERG, MSDS, NIOSH, TLV-Book (all TLVs, TWA, STELs, C,) Ergonomics, Non ionizing and radiation hazards and controls
OSHA Government Regulations (including 1910.120) TLV-Documentation continued and OSHA PEL's, STEL, Ceiling limits and special chemical hazard regulations (ie. Asbestos, methylene chloride, Hexavalent Chromium)
Temperature Extremes, Noise, Fall Protection, Fire Protection, Confined space, Biosafety/Indoor Air Quality & Mold Assessment
Personal Protective Equipment Controls (Respirators, Safety Glasses, Protective suits, etc.) hands-on exercises
Ventilation/engineering controls
Medical Surveillance and TLVs- BEIs, spill containment, absorption and disposal methods, Container drum handling & decontamination hands-on practice & technique drills
Thanksgiving recess
Health & Safety Plan review & exercise
HAZMAT zones, role assignments, incident command and pre- emergency response drill hands-on activities
HAZWOPER emergency response hands-on incident drill

Learning Goals

Knowledge:

Understanding the fundamentals of industrial hygiene and apply to biological, physical and chemical hazard release safe mitigation methods. Proposed instructional and assessment activities include one quiz, one midterm and final to ascertain the knowledge retained in the class. (15% of quiz, 39% of midterm, 44% of final exam assessment and 2% participation in hands on exercises and field drills)

Skills:

Develop methods and techniques on how to recognize, evaluate and control accidental or predicted biological, physical and chemical hazard releases. Proposed instructional and assessment activities include homework assignments to sharpen skills necessary to develop a successful career in the industrial hygiene/emergency response field. (Two homework assignments for 50% of assessment and Health and Safety Plan (HASP) development assignment of 50% assessment)

Analysis:

How to evaluate the chemical, biological or physical human sensory detection or through current, accredited and acceptable industrial hygiene collection or measurement results in comparison to various Federal, State or Municipal codes, regulations and standards. Proposed instructional and assessment activities will include field drills on using industrial hygiene instrumentation, analyzing and interpreting data. (100% of assessment)

Teams:

How to recognize, evaluate and control biological, physical and chemical agents through utilizing small group projects and drills. Proposed instructional and assessment activities designed to help the student function on an emergency response team or environmental, health and safety department multifunction department. Such activities will include a team assignment to develop a HASP. (100% of assessment)

Communication:

How to effectively convey the evaluation, recognition and control of hazards to personnel of interest. This would involve verbal discussions, meetings and formal presentations. Proposed instructional and assessment activities include the desktop and spill drill where students will role-play and engage in an incident command scenario. (participant-50% and active participant-50%)

Ethics:

Ensure students understand professional industrial hygiene ethics and possible real life issues of concern. Proposed instructional and assessment activities include a review of the American Board of Industrial Hygiene Code of Ethics and OSHA regulatory standards of compliance. A few questions will be presented on this topic in the quiz and midterm. (100% of assessment)

Issues:

Understand the issues behind the evaluation, recognition and controls. Proposed instructional and assessment activities include engaging the students in a desktop and field spill drill exercise where the issue is a hazardous spill release. (100% of assessment)

Lifelong:

Emphasis on the usage of various professional recognition methods and techniques in regards to detecting the presence of biological, chemical and physical hazards. Proposed instructional and assessment activities include brief presentations during class time on usage of the industrial hygiene methods and techniques to apply when employed professionally. Several questions will be presented on the quiz, midterm and final exams. (100% of assessment)

Performance Target Criteria

Learning Goals	Unsatisfactory (D or F)	Satisfactory (C)	Good (B)	Outstanding (A)
1. **Knowledge.** Ability to understand the fundamentals of industrial hygiene and apply to biological, physical and chemical hazard release safe mitigation control methods.	Does not attempt to understand the usage of industrial hygiene fundamentals and its application to various hazards and controls. This is based on only answered 60% or less questions correctly on the quiz, midterm and final exam.	Attempts to understand the usage of industrial hygiene fundamentals and its application to various hazards and controls. This is based on answering 70% or more questions correctly on the quiz, midterm and final exam.	Successfully to understand the usage of industrial hygiene fundamentals and its application to various hazards and controls. This is based on answering 80% or more questions correctly on the quiz, midterm and final exam.	Masters the usage of industrial hygiene fundamentals and its application to various hazards and controls. This is based on answering 90% or mor questions correctly on t quiz, midterm and final exam.
2. **Skills.** Ability to develop methods and techniques on how to recognize, evaluate and control accidental or predicted biological, physical and chemical hazard releases.	Is not able to develop methods and techniques on how to recognize, evaluate and control accidental or predicted biological, physical and chemical hazard releases. This is based on only answered 60% or less questions correctly on the quiz, midterm and final exam.	Is not able to fully comprehend methods and techniques on how to recognize, evaluate and control accidental or predicted biological, physical and chemical hazard releases. This is based on answering 70% or more questions correctly on the quiz, midterm and final exam.	Shows proficiency to develop methods and techniques on how to recognize, evaluate and control accidental or predicted biological, physical and chemical hazard releases. This is based on answering 80% or more questions correctly on the quiz, midterm and final exam.	Masters in its entirety t develop methods and techniques on how to recognize, evaluate a control accidental or predicted biological, physical and chemica hazard releases. This is based on answering 90% or more questions correctly on the quiz, midterm and final exam
3. **Analysis.** Ability to evaluate the chemical, biological or physical human sensory detection or through current, accredited and acceptable industrial hygiene collection or measurement results in comparison to various Federal, State or Municipal codes, regulations and standards.	Cannot evaluate the chemical, biological or physical human sensory detection or through current, accredited and acceptable industrial hygiene collection or measurement results in	Ability to evaluate the chemical, biological or physical human sensory detection or through current, accredited and acceptable industrial hygiene collection or measurement results but shows difficulty in comparison to various Federal, State or Municipal codes, regulations and standards. This is based on answering 70% or	Ability to evaluate the chemical, biological or physical human sensory detection or through current, accredited and acceptable industrial hygiene collection or measurement results shows good comparison to various Federal, State or Municipal codes, regulations and standards. This is based on answering 80% or more questions correctly	Fully effective in the ability to evaluate the chemical, biological physical human senso detection or through current, accredited an acceptable industrial hygiene collection or measurement results comparison to variou Federal, State or Municipal codes, regulations and standards. This is based on answering

	comparison to various Federal, State or Municipal codes, regulations and standards. This is based on only answered 60% or less questions correctly on the quiz, midterm and final exam.	more questions correctly on the quiz, midterm and final exam.	on the quiz, midterm and final exam.	90% or more questions correctly on the quiz, midterm and final exam
4. **Teamwork.** How to recognize, evaluate and control biological, physical and chemical agents through utilizing small group projects and drills participation.	Does not show up for class, does not participate in group desktop and drill exercise.	Shows up for class, contributes to the exercises, but does not participate.	Shows leadership in conducting desktop and spill drill exercises, participates in class, and volunteers as Deputy Incident Commander in the drill.	Shows leadership in all desktop exercises and voluntarily serves as Incident Commander in the spill drill exercise. Active participation in class.
5. **Communication.** How to effectively convey the evaluation, recognition and control of hazards to personnel of interest. This would involve verbal discussions, meetings and formal presentations.	Does not complete the HASP, homework assignment or spill drill assignment.	Completes the HASP, homework assignment and spill drill but does not participate in formal presentations in front of classmates.	Completes the HASP, homework assignment and spill drill with few errors found. Participates in formal presentations in front of classmates.	Completes the HASP, homework assignment and spill drill with no o limited errors. Participates in formal presentations in front o classmates.
6. **Ethics.**Ensure students understand professional industrial hygiene ethics and possible real life issues of concern.	Does not comprehend the ethics portion of the class topic and does not have any correct answers on the midterm.	Comprehends the ethics portion of the class topic and answers correctly on less than 70% of the questions.	Comprehends the ethics portion of the class topic and answers correctly on more than 80% of the questions.	Comprehends the ethic portion of the class topi and answers correctly o 90% or all of the questions.
7. **Issues.**Understand the issues behind the evaluation, recognition and controls methods.	Does not understand the concepts of basic industrial hygiene and emergency response methods to evaluate,	Does not fully understand the concepts of basic industrial hygiene and emergency response methods to evaluate,	Full understanding of concepts of basic industrial hygiene and emergency response methods to evaluate,	Masters the concepts of basic industrial hygiene and emergency respons methods to evaluate, recognize or control

	recognize or control hazardous releases per 60% wrong answers on the quiz, midterm and final exam and misuse during the exercises.	recognize or control hazardous releases per 30% wrong answers on the quiz, midterm and final exam and misuse during the exercises.	recognize or control hazardous releases per 20% wrong answers on the quiz, midterm and final exam and misuse during the exercises.	hazardous releases per less than 10% wrong answers on the quiz, midterm and final exan and misuse during the exercises.
8. **Lifelong.**Emphasis on the usage of various professional recognition methods and techniques in regards detecting the presence of biological, chemical and physical hazards.	Does not understand the various professional methods or techniques regarding the detection of biological, chemical and physical hazards based on 60% wrong answers on the quiz, midterm and final exam and misuse during the exercises.	Shows some understanding to the various professional methods or techniques regarding the detection of biological, chemical and physical hazards based on less than 30% wrong answers on the quiz, midterm and final exam and misuse during the exercises.	Shows some understanding to the various professional methods or techniques regarding the detection of biological, chemical and physical hazards based on less than 20% wrong answers on the quiz, midterm and final exam and misuse during the exercises.	Shows some understanding to the various professional methods or techniques regarding the detection biological, chemical an physical hazards based less than 10% wrong answers on the quiz, midterm and final exan and misuse during the exercises.