National Fire Academy

R0233 – Chemistry for Emergency Response
Version: 5th Edition, 6th Printing, January 2022
Quarter:
ACE Credit: In the lower division baccalaureate/associate degree category, three semester hours in fire science, chemistry, general science, hazardous materials, or physical science.
IACET Continuing Education Units: 5.7

Length of Course: 10 Days (57 hr., 5 min. contact hours, Monday – Friday)
Prerequisite: Yes
Curriculum: Hazardous Materials
Training Specialist: Dave Donohue
Instructor:
Instructor email/phone:
Classroom: J-
Meeting Time: 8 AM – 5 PM

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Course Description (Catalog)

R0233 – "Chemistry for Emergency Response." This 10-day course is designed to prepare the responder to function safely at the scene of a hazardous materials incident by understanding the potential hazards. This is accomplished by gaining recognition of chemical nomenclature and basic principles of chemistry in order to assess risks to responders and the public.

The course seeks to convey to first responders or prevention personnel a sound understanding of the basic chemistry of hazardous materials to permit them to correctly assess the threat posed by hazardous materials incidents that may occur accidentally or intentionally.

Problem-solving sessions and interactive discussion cover topics such as salts and inorganic nonsalts, hydrocarbons, hydrocarbon derivatives and hydrocarbon radicals. Applying the science of chemistry to thermodynamics, volatility and combustion provides real-world opportunities.

An understanding of basic chemistry is helpful to receive maximum benefit from the course.

Student Qualifications (Primary and Secondary Audience)

The target audience for "Chemistry for Emergency Response" (CER) are emergency response personnel who have responsibility for analysis, management and/or tactical response to hazardous materials incidents; fire prevention inspectors, hazardous materials inspectors, regulators, and planners where knowledge of the chemical behavior of hazardous materials is essential.

Course Scope (Goal)

The goal of this course is to provide the student with the knowledge of chemistry necessary to perform a chemical analysis and risk assessment for the purpose of implementing a risk-based process during hazardous materials/ weapons of mass destruction (WMD) incident response.

Course Objectives (Course Learning Outcomes – TLOs)

After successfully completing this course, you will be able to accomplish the following:

- Conduct an initial product analysis for a given product using limited information.
- Explain the logical and systematic order of elements using the periodic table.
- Analyze seven families of salts, including name, general formula, hazards and any special rules.
- Analyze five families of inorganic nonsalts, including name, general formula, hazards and any special rules.
- Analyze four families of hydrocarbons, including name, formula, chemical structure, hazards, and any special characteristics.
- Analyze the components that comprise all hydrocarbon derivative compounds.
- Analyze 13 families of hydrocarbon derivatives, including name, general formula, hazards and any special rules.
- Using knowledge of the chemical families, as well as the chemical and physical properties for a given hazardous material, analyze the hazards of the material.
- Reinforce key concepts presented in the course and the relationship of those concepts to their own work responsibilities.

Course Delivery Method

The National Fire Academy (NFA) offers specialized training courses and advanced management programs of national impact in an academic classroom environment on campus at the National Emergency Training Center (NETC) in Emmitsburg, Maryland. This classroom course is designed for the national level fire service officer from State and local fire service organizations. During this 10-day delivery, students will reside in dormitories provided on campus with classes conducted in classrooms designed for critical student/instructor interaction. All course materials are designed for interactive classroom environments, in either paper notebook or electronic formats.

Course Schedule

The purpose of the course schedule is to give you, at a glance, the required preparation, activities, and evaluation components of your course.

DAY 1	DAY 2
Introduction NFA Orientation	Review of Day 1
Activity I.1: Student Introductions	Unit 3: Salts Activity 3.1: Binary Salts Activity 3.2: Metal Oxides
Break	*Break*
Unit 1: Product Analysis and Risk Assessment Activity 1.1: Chemistry Terminology for Risk-Based Response	Unit 3: Salts (cont'd) Activity 3.3: Hydroxide Salts Activity 3.4: Peroxide Salts
Break	*Break*
Unit 1: Product Analysis and Risk Assessment (cont'd) Activity 1.2: Initial Product Analysis	Unit 3: Salts (cont'd) Activity 3.5: Cyanide Salts Activity 3.6: Oxysalts
Lunch Break	*Lunch Break*
Unit 2: The Periodic Table and Atomic Structure	Unit 3: Salts (cont'd) Activity 3.7: All Salt Families
Break	*Break*
Unit 2: The Periodic Table and Atomic Structure (cont'd) Activity 2.1: The Periodic Table and 40 Common Elements	Unit 3: Salts (cont'd) Activity 3.8: Salt Hazards Scenario
Unit 2: The Periodic Table and Atomic Structure (cont'd) Learning Checkpoints: Product Analysis and Risk Assessment, The Periodic Table and Atomic Structure	Unit 3: Salts (cont'd) Learning Checkpoint: Salts
Day 1 Evening Orientation to Chemical Reference Databases (WISER, NIOSH online, ERDSS/Chemical Companion). Complete worksheets in Activity 2.1 not completed in class; memorize the 40 common elements.	Day 2 Evening Complete chemical family recognition worksheets not completed in class for Activities 3.1, 3.2, 3.3, 3.4, 3.5, 3.6 and 3.7. Complete chemical family summary worksheets for each salt family. Evening Session

DAY 3	DAY 4
Review of Day 2	Review of Day 3
Unit 4: Inorganic Nonsalts Activity 4.1: Binary Nonsalts and Nonmetal Oxides	Unit 5: Hydrocarbons (cont'd) Activity 5.1: Alkane Hydrocarbons
Break	*Break*
Activity 4.2: Binary Acids, Oxyacids and Inorganic Cyanides Activity 4.3: All Inorganic Nonsalt Families	Unit 5: Hydrocarbons (cont'd) Activity 5.2: Alkene Hydrocarbons Activity 5.3: Alkyne Hydrocarbons
Break	*Break*
Unit 4: Inorganic Nonsalts (cont'd) Activity 4.4: Recognizing Oxidizers	Unit 5: Hydrocarbons (cont'd) Activity 5.4: Aromatic Hydrocarbons Activity 5.5: All Hydrocarbon Families
Lunch Break	*Lunch Break*
Activity 4.5: Terminology for Analysis of Toxicity Hazards Unit 4: Inorganic Nonsalts (cont'd) Activity 4.6: Toxicology Research	Activity 5.5: All Hydrocarbon Families (cont'd) Unit 5: Hydrocarbons (cont'd) Learning Checkpoint: Hydrocarbons
Break	*Break*
Unit 4: Inorganic Nonsalts (cont'd) Learning Checkpoint: Inorganic Nonsalts	Mid-course Review
Unit 5: Hydrocarbons	

Day 3 Evening
Complete chemical recognition worksheets not completed in class for Activities 4.1, 4.2 and 4.3.
Complete chemical family summary worksheets for each inorganic nonsalt family.
Evening Session

Day 4 Evening
Complete chemical family recognition worksheets not completed in class for Activities 5.1, 5.2, 5.3, 5.4 and 5.5.
Complete chemical family summary worksheets for each hydrocarbon family.
Study for Midterm Exam
Evening Session

DAY 5	DAY 6
Review for Midterm	Review of Week 1
Midterm Exam	Review of Day 5 Unit 7: Hydrocarbon Derivatives (cont'd)
Break	*Break*
Review Midterm Exam; Record and Share Scores with Students Unit 6: Hydrocarbon Radicals and International Union of Pure and Applied Chemistry	Unit 7: Hydrocarbon Derivatives (cont'd) Activity 7.2: Halogenated Hydrocarbons
Break	*Break*
Activity 6.1: Hydrocarbon Radicals Unit 6: Hydrocarbon Radicals and International Union of Pure and Applied Chemistry (cont'd) Activity 6.2: Hydrocarbon International Union of Pure and Applied Chemistry Naming	Unit 7: Hydrocarbon Derivatives (cont'd) Activity 7.3: Nitrogen Compounds Unit 7: Hydrocarbon Derivatives (cont'd) Activity 7.4: Oxygen Compounds (Ethers and Peroxides)
Lunch Break	*Lunch Break*
Learning Checkpoint: Hydrocarbon Radicals Unit 6: Hydrocarbon Radicals and International Union of Pure and Applied Chemistry (cont'd)	Unit 7: Hydrocarbon Derivatives (cont'd) Activity 7.5: Sulfur Compounds (Sulfides and Mercaptans)
Break	*Break*
Unit 7: Hydrocarbon Derivatives Activity 7.1: Functional Group Identification	Unit 7: Hydrocarbon Derivatives (cont'd) Activity 7.6: Alcohols
Unit 7: Hydrocarbon Derivatives (cont'd)	Day 6 Summary

Day 6 Evening
Complete chemical family recognition worksheets not completed in class for Activities 7.1, 7.2, 7.3, 7.4 and 7.5.
Complete chemical family summary worksheets for each hydrocarbon derivative family covered on this day.
Evening Session

DAY 7	DAY 8
Review of Day 6	Review of Day 7
Unit 7: Hydrocarbon Derivatives (cont'd) Activity 7.7: Ketones and Aldehydes Activity 7.8: Organic Acids and Esters	Unit 8: Physical and Chemical Properties (cont'd) Unit 9: Application Activities Activity 9.1: The 50 Chemical Activity
Break	*Break*
Activity 7.9: All Hydrocarbon Derivative Families Activity 7.10: Hydrocarbon Derivative Incident Scenarios	Unit 9: Application Activities (cont'd)
Break	*Break*
Unit 7: Hydrocarbon Derivatives (cont'd) Learning Checkpoint: Hydrocarbon Derivatives	Unit 9: Application Activities (cont'd) Activity 9.2: Hazard Analysis Briefing to the Incident Commander
Lunch Break	*Lunch Break*
Unit 8: Physical and Chemical Properties Activity 8.1: Effect of Molecular Weight on Physical and Chemical Properties	Activity 9.2: Hazard Analysis Briefing to the Incident Commander (cont'd) Group 1 Presentation Group 2 Presentation Group 3 Presentation
Break	*Break*
Unit 8: Physical and Chemical Properties (cont'd) Activity 8.2: Effect of Polarity on Compounds of Similar Molecular Weight on Physical and Chemical Properties Activity 8.3: Effect of Branching on Physical and Chemical Properties	Group 4 Presentation Group 5 Presentation (only if class size necessitates a fifth group) Course Review
Unit 8: Physical and Chemical Properties (cont'd) Learning Checkpoint: Physical and Chemical Properties	Course Review (cont'd)

Day 7 Evening
Complete chemical family recognition worksheets not completed in class for Activities 7.7, 7.8 and 7.9.
Complete chemical family summary worksheets for each hydrocarbon derivative family covered on this day.
Evening Session

Day 8 Evening
Study for Final Exam
Evening Session

DAY 9	DAY 10
Unit 10: Course Summation	Graduation
Unit 10: Course Summation (cont'd)	Graduation (cont'd)
Break	
Unit 10: Course Summation (cont'd) Final Exam	
Break	
Final Exam (cont'd)	
Lunch Break	
Unit 11: The Way Forward Activity 11.1: Recognizing Complex Structures	
Break	
Unit 11: The Way Forward (cont'd)	

Course Resources (Instructional Materials)

In order to be fully prepared, obtain a copy of the required textbooks and other instructional materials prior to the first day of class.

Required Readings

The student must complete required readings during the course to be able to thoughtfully participate in discussions and activities.

"Foundational Concepts of Chemistry" (Q0228), available through NFA Online at http://www.usfa.fema.gov/training/nfa/courses/online.html.

Pre-course Assignments Packet, including the following mandatory pre-course readings and assignments:

- Introduction to Chemistry of Hazardous Materials
- Overview of Physical and Chemical Properties
- Assessing Risk: Toxic Exposure Limits
- Memorize the names and chemical symbols for 40 common elements on the periodic table.

Emergency Response Decision Support System (ERDSS) (aka, Chemical Companion), a portal for information about hazardous materials chemistry.

Suggested Reading/Resources

Suggested readings and resources are not evaluated, but may enhance the student's understanding, serve as additional sources for citation and promote discussion of course material.

Byrnes A. & Noll, G. (2016, November 1). *The jack rabbit tests: Catastrophic releases of compressed liquefied gases.* Retrieved from http://www.fireengineering.com/articles/print/volume-169/issue-11/features/the-jack-rabbit-tests-catastrophic-releases-of-compressed-liquefied-gases.html

Cyanide Poisoning Treatment Coalition. (March 2009). *Cyanide and carbon monoxide: The toxic twins of smoke inhalation* (Educational supplement, Volume 2). Indianapolis, IN: Author. Retrieved from www.firesmoke.org

Daniels, R. D., Kubale, T. L., Yiin, J. H., Dahm, M. M., Hales, T. R., Baris, D., Zahm, S. H., Beaumont, J. J., Waters, K. M., & Pinkerton, L. E. (2013). *Mortality and cancer incidence in a pooled cohort of US firefighters from San Francisco, Chicago and Philadelphia (1950-2009).* Occupational & Environmental Medicine. doi:10.1136/oemed-2013-101662

Dayah, M. (1997, October 1). *Dynamic periodic table*. Retrieved from http://www.ptable.com

Fabian, T., Borgerson, J. L., Kerber, S. L., Gandhi, P. D., Baxter, C. S., Ross, C. S., Lockey, J. E., Dalton, J. M. (April 1, 2010). *Firefighter exposure to smoke particulates* (Final Report, 2007-FP-02093) [PDF]. Underwriter Laboratories: Northbrook, IL. Retrieved from http://www.ul.com/global/documents/offerings/industries/buildingmaterials/fireservice/WEBDOCUMENTS/EMW-2007-FP-02093.pdf

Fent, K. W., Eisenberg, J., Evans, D., Sammons, D., Robertson, S., Striley, C., Snawder, J., Mueller, C., Kochenderfer, V., Pleil, J., Stiegel, M., & Horn, G. P. (December 2013). *Evaluation of dermal exposure to polycyclic aromatic hydrocarbons in fire fighters* (Health Hazard Evaluation Report No. 2010-0156-3196) [PDF]. United States Department of Health and Human Services, National Institute of Occupational Health: Washington D.C. Retrieved from http://www.cdc.gov/niosh/hhe/ reports/pdfs/2010-0156-3196.pdf

Firefighter Cancer Support Network. (2013). *Taking action against cancer in the fire service*. Retrieved from http://www.firefightercancersupport.org/wp-content/uploads/2013/08/Taking-Action-against-Cancer-in-the-Fire-Service.pdf

Georgia Tech Research Institute. (2016). *Emergency response decision support system (ERDSS)*. Retrieved from https://www.chemicalcompanion.org/

Hang, B., Sarker, A. H., Havel, C., Saha, S., Hazra, T. K., Schick, S., Jacob, P., Rehan, V. K., Chenna, A., Sharan, D., Sleiman, M., Destaillats, H., & Gundel, L. A. (2013). Thirdhand smoke causes DNA damage in human cells. *Mutagenesis, 28 (4):* 381–391.doi.10.1093/mutage/get013

IFSTA. (2013). *Essentials of firefighting* (6th ed.). Stillwater, OK: Fire Protection Publications.

The InterAgency Board, Equipment Subgroup. (September 2012). *Evaluation of hazards in the post-fire environment* [PDF]. Retrieved from http://www.interagencyboard.org/sites/default/files/publications/Evaluation%20of%20Hazards%20in%20the%20Post-Fire%20Environment.pdf

Lewis, R. J. (2001). *Hawley's condensed chemical dictionary* (14th ed.). New York: John Wiley and Sons. doi:10.1002/9780470114735

Lewis, R. J. (2014). *Sax's dangerous properties of industrial chemicals*, Volume 2 (3rd ed.). New York: John Wiley and Sons. doi:10.1002/0471701343

Merck KGaA. *EMD PTE*. EMD Chemicals, Inc. Available for iOS from the Apple App Store: https://itunes.apple.com/us/app/emd-pte/id377393859?mt=8; Available for Android from the Google Play Store: https://play.google.com/store/apps/details?id=com.merckgroup.pte&hl=en

National Fire Protection Association. (2014). 1851 *Standard on selection, care, and maintenance of protective ensembles for structural fire fighting and proximity fire fighting*. Retrieved from http://codesonline.nfpa.org/NFPA/a/c.html/nfpa_1851_2014

National Institute of Occupational Safety and Health. (September 2007). NIOSH pocket guide to chemical hazards. Retrieved from https://www.cdc.gov/niosh/docs/2005-149/pdfs/2005-149.pdf

Royal Society of Chemistry. (2015). *ChemSpider*. Retrieved from http://www.chemspider.com

U.S. National Library of Medicine, Specialized Information Services. (2015). *Wireless information system for emergency responders (WISER).* Retrieved from https://www.wiser.nlm.nih.gov/

U.S. National Library of Medicine, Specialized Information Services. (2015). *WebWiser*. Retrieved from http://webwiser.nlm.nih.gov/getHomeData.do;jsessionid=69CF93248E9ECB7C97991743DFA7FDA7

Grading Methodology (Evaluation Procedures)

Evaluation Plan Summary

Each of the units in the course has enabling objectives that build to the unit terminal objective. The unit terminal objectives are directly related to the course goal. Each enabling objective is evaluated on the two tests — the midterm and final exams.

Before the tests, an instructor led review will be provided based on the objectives of the course. During this presentation, the students will be encouraged to develop a handwritten "study aid," that can be used on the tests. The intent is to allow instructors the flexibility to use blank sheets of paper or the "chemical family summary worksheets" for the students to develop their own job aid. The Chemical, Biological, Radiological and Nuclear (CBRN) job aid may also be offered during the midterm and final exams.

Students are also provided with Learning Checkpoints for each unit. These checkpoints are self-administered and self-graded so that students have a tool to measure their progress. These student checkpoints are **not** calculated into the final grade.

The final graded activity is designed to measure the student's ability to gather and interpret chemical information in a team setting, and then deliver accurate information to a decision-maker. The rubric for this activity will be focused on smart practices when briefing an Incident Commander (IC) at a hazmat/WMD incident.

Students who do not complete the entire course will be awarded an incomplete (I) grade. In accordance with NFA academic policies, an incomplete (I) grade must be removed by the end of the next semester following the course, or it automatically becomes a failing (F) grade.

If you fail an on-campus course, you will not be issued a stipend for that course. You can reapply for the failed course, or any other NFA course, and go through the random selection process. You don't have to successfully complete the failed course before attending another NFA course.

http://www.usfa.fema.gov/training/nfa/admissions/student_policies_campus_information.html

Graded Components

Students are evaluated on three graded components: a written exam covering material in the first week of the course, a comprehensive oral presentation, and a comprehensive written exam covering all course material. These three components are weighted as follows.

EVALUATED COMPONENT	WEIGHT
Midterm Exam	30 percent
Final Exam	50 percent
Activity 9.2: Hazard Analysis Briefing to the Incident Commander	20 percent
Total	100 percent

Course Outline

Introduction

Objectives

None.

Unit 1: Product Analysis and Risk Assessment

Objectives

Terminal Objective

The students will be able to:

1.1 Conduct an initial product analysis for a given product using limited information.

Enabling Objectives

The students will be able to:

1.1 Define "risk-based response," as defined by National Fire Protection Association (NFPA) 472, Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents.

1.2 Describe the four components of risk that must be assessed at a hazardous materials/weapons of mass destruction (WMD) incident.

1.3 Recognize the importance of chemistry and chemistry terminology to formulating a risk-based response.

1.4 Describe the five points of information needed to conduct an initial product analysis.

Unit 2: The Periodic Table and Atomic Structure

Objectives

Terminal Objective

The students will be able to:

2.1 Explain the logical and systematic order of elements using the periodic table.

Enabling Objectives

The students will be able to:

2.1 Describe parts of the atom and provide their location, charges and weights.

2.2 Define the components and the use of the periodic table.

2.3 Name at least four families on the periodic table and provide their general characteristics.

2.4 Analyze four rules used in building the atom.

2.5 Given a chemical symbol from the list of 40 common elements in this course, identify the name of the element and the location of the element on the periodic table.

2.6 Explain what constitutes an isotope.

2.7 Identify potentially radioactive elements.

2.8 Explain the two types of bonding and describe their effects.

Unit 3: Salts

Objectives

Terminal Objective

The students will be able to:

3.1 Analyze seven families of salts, including name, general formula, hazards and any special rules.

Enabling Objectives

The students will be able to:

3.1 Describe the general formula, naming rules and hazards for seven families of salts.

3.2 Given the name of a salt compound, identify the chemical formula, family and hazards of the family.

3.3 Given a formula for a salt compound, determine the compound's name, family and hazards of the family.

3.4 Given a description of a substance involved in an incident, identify the type of salt and the potential hazards involved.

3.5 Identify elements and compounds that tend to be reactive because of chemical reactivity or physical state.

Unit 4: Inorganic Nonsalts

Objectives

Terminal Objective

The students will be able to:

4.1 Analyze five families of inorganic nonsalts, including name, general formula, hazards and any special rules.

Enabling Objectives

The students will be able to:

4.1 Describe the general formula, naming rules and hazards for five families of inorganic nonsalts.

4.2 Given a name of an inorganic nonsalt compound, identify the chemical formula, family and hazards of the family.

4.3 Given a chemical formula for an inorganic nonsalt compound, determine the compound's name, family and hazards of the family.

4.4 Define pH, strength, concentration, acid and base.

4.5 Given a description of a substance involved in an incident, identify the type of inorganic nonsalt and the potential hazards involved.

4.6 Describe what makes an oxidizer and its hazards.

4.7 Discuss the relevance and importance of various types of toxicological terms and data to a hazard analysis.

4.8 Define Immediately Dangerous to Life and Health (IDLH), acute and chronic effects, and the routes of exposure.

4.9 Research exposure limits, toxicity and other hazard information about a chemical and present a summary of findings to a nontechnical audience.

Unit 5: Hydrocarbons

Objectives

Terminal Objective

The students will be able to:

5.1 Analyze four families of hydrocarbons, including name, formula, chemical structure, hazards, and any special characteristics.

Enabling Objectives

The students will be able to:

5.1 Given the name, formula or chemical structure of a hydrocarbon compound, identify the chemical formula, bond type, hydrocarbon family and hazards of the family.

5.2 Define isomer.

5.3 Define polymerization.

Unit 6: Hydrocarbon Radicals and International Union of Pure and Applied Chemistry

Objectives

Terminal Objective

The students will be able to:

6.1 Analyze the components that comprise all hydrocarbon derivative compounds.

Enabling Objectives

The students will be able to:

6.1 Identify at least eight hydrocarbon radicals: four alkane radicals, two alkene radicals and two aromatic radicals.

6.2 Explain the naming rules of the International Union of Pure and Applied Chemistry (IUPAC) as they apply to hydrocarbons, hydrocarbon radicals and isomers of hydrocarbon compounds.

Unit 7: Hydrocarbon Derivatives

Objectives

Terminal Objective

The student will be able to:

7.1 Analyze 13 families of hydrocarbon derivatives, including name, general formula, hazards and any special rules.

Enabling Objectives

The students will be able to:

7.1 Given examples of chemical structures and formulas for hydrocarbon derivative compounds, identify the functional group component within the compound.

7.2 Describe the general formula, naming rules and hazards for 13 families of hydrocarbon derivatives.

7.3 Given the chemical formula, structure or name of a hydrocarbon derivative compound, determine the family and hazards of the family.

7.4 Given information on a hydrocarbon derivative compound, determine the chemical formula or name of the compound.

Unit 8: Physical and Chemical Properties

Objectives

Terminal Objective

The students will be able to:

8.1 Using knowledge of the chemical families, as well as the chemical and physical properties for a given hazardous material, analyze the hazards of the material.

Enabling Objectives

The students will be able to:

8.1 Apply the key physical and chemical properties of hazardous materials.

8.2 Analyze the relationships between physical properties and their implications for the behavior of a material.

8.3 Define combustion.

8.4 Assess how molecular weight (MW), polarity and structure affect physical properties.

Unit 9: Application Activities

Objectives

Terminal Objective

The students will be able to:

9.1 Analyze chemical information in an accurate and timely manner in order to determine the hazards and the relative severity of the hazards of the given chemicals.

Enabling Objectives

The students will be able to:

9.1 Predict physical and chemical properties based on knowledge of chemical composition, chemical family, and the hazards associated with the chemical family.

9.2 Identify hazards posed by various chemicals.

9.3 Prioritize severity of hazards.

9.4 Present a clear, concise and accurate summary of hazard analysis information to a nontechnical audience.

Unit 10: Course Summation

Objectives

None.

Unit 11: The Way Forward

Objectives

Terminal Objective

The students will be able to:

11.1 Reinforce key concepts presented in the course and the relationship of those concepts to their own work responsibilities.

Enabling Objectives

The students will be able to:

11.1 Recognize that this course provides a foundational knowledge of hazardous materials chemistry, but that there is much more that can be learned.

11.2 Discuss ways to pursue opportunities for continued learning and continued application of their knowledge of hazardous materials chemistry.

11.3 Given a selection of chemicals not covered in the course, apply their knowledge of the chemistry of hazardous materials to the given chemical structure in order to identify the chemical and its potential hazards.

Policies

Class Attendance and Cancellation Policy

Attendance

- You are required to attend all sessions of the course. If you do not, you may not receive a certificate, and your stipend may be denied.

- If you need to depart campus early and miss any portion of the course and/or graduation, you must make the request in writing to the NFA training specialist. The training specialist, in collaboration with the superintendent, may waive the attendance requirement in order to accommodate you with extraordinary circumstances as long as you complete all course requirements. If you receive approval for departing early, you must forward the approval to the Admissions Office so your stipend reimbursement is not limited.

Student Substitutions

Substitutions for NFA courses are made from waiting lists; your fire department can't send someone in your place.

Cancellations or No-Shows

NFA's mission for delivery of courses is impaired significantly by cancellations and no-shows. It is very difficult and costly to recruit students at the last minute. Currently there is a two-year ban on student attendance for students who are no-shows or cancel within 30 days of the course start date without a valid reason. If you receive such a restriction, your supervisor needs to send a letter to our Admissions Office explaining the cancellation/no-show.

Course Failure

If you fail an on-campus course, you will not be issued a stipend for that course. You can reapply for the failed course or any other NFA course and go through the random selection process. You don't have to successfully complete the failed course before attending another NFA course.

Student Code of Conduct Policy

Students, instructors and staff are expected to treat each other with respect at all times. Inappropriate behavior will not be tolerated and may result in removal from campus and denial of stipends.

Writing Expectations

Student writing will conform to the generally accepted academic standards for college papers. Papers will reflect the original work of the student and give appropriate credit through citations

for ideas belonging to other authors, publications or organizations. Student written work should be free of grammatical and syntax errors, free of profanity or obscene language or ideas, and reflect critical thinking related to the course subject matter.

Citation and Reference Style

Attention Please: Students will follow the APA, Sixth Edition as the sole citation and reference style used in written work submitted as part of coursework to NFA. Assignments completed in a narrative essay, composition format, abstract, and discussion posts must follow the citation style cited in the APA, Sixth Edition.

Late Assignments

Students are expected to submit classroom assignments by the posted due date (11:59 p.m. EDT/EST) and to complete the course according to the published class schedule. As adults, students, and working professionals, you must manage competing demands on your time. Discussion board postings submitted within 3 days after the submission deadline will receive up to a 20% deduction. Those that do not submit their discussion board postings within this timeline will receive a "0" grade for the week. Final assignment papers will not be accepted after the deadline. Any paper submitted after the deadline will receive a "0" grade for that assignment.

Netiquette

Online learning promotes the advancement of knowledge through positive and constructive debate – both inside and outside the classroom. Forums on the Internet, however, can occasionally degenerate into needless insults and "flaming." Such activity and the loss of good manners are not acceptable in a professional learning setting – basic academic rules of good behavior and proper "Netiquette" must persist. Remember that you are in a place for the rewards and excitement of learning which does not include descent to personal attacks or student attempts to stifle the forum of others.

- Technology Limitations. While you should feel free to explore the full-range of creative composition in your formal papers, keep e-mail layouts simple. The NFA Online classroom may not fully support MIME or HTML encoded messages, which means that bold face, italics, underlining, and a variety of color-coding or other visual effects will not translate in your e-mail messages.

- Humor Note. Despite the best of intentions, jokes and especially satire can easily get lost or taken seriously. If you feel the need for humor, you may wish to add "emoticons" to help alert your readers: ;-), :), ☺ .

Disclaimer Statement

Course content may vary from the outline to meet the needs of this particular group.

Grading

Please review the following rubrics that explain how grades will be awarded.

Students who do not complete the entire course will be awarded an Incomplete (I) grade. In accordance with National Fire Academy academic policies, an Incomplete (I) grade must be removed by the end of the next semester following the course, or it automatically becomes a Failing (F) grade.

If you fail an on-campus course, you will not be issued a stipend for that course. You can reapply for the failed course or any other NFA course and go through the random selection process. You don't have to successfully complete the failed course before attending another NFA course.

http://www.usfa.fema.gov/training/nfa/admissions/student_policies.html

Academic Honesty

Students are expected to exhibit exemplary ethical behavior and conduct as part of the NFA community and society as a whole. Acts of academic dishonesty including cheating, plagiarism, deliberate falsification, and other unethical behaviors will not be tolerated.

Students are expected to report academic misconduct when they witness a violation. All cases of academic misconduct shall be reported by the instructor to the Training Specialist.

If a student is found to have engaged in misconduct and the allegations are upheld, the penalties may include, but are not limited to one or a combination of the following:

- expulsion,
- withholding of stipend or forfeiture of stipend paid,
- exclusion from future classes for a specified period; depending on the severity it could range from 1-10 years, and/or
- forfeiture of certificate for course(s) enrolled in at NETC.

Refer to NFA-specific Standard Operating Procedure 700.1 – *Academic Code of Conduct and Ethics* for more information.

Grading Rubric

Activity 9.2: Hazard Analysis Briefing to the Incident Commander

Assessment Area					
Hazards Analysis	**Poor (2 points)**	**Fair (4 points)**	**Good (6 points)**	**Excellent (8 points)**	**Points**
Did the group accurately identify and prioritize potential hazards based on analysis of the information given?	The group failed to identify two or more potential hazards.	The group analyzed the scenario and the chemicals involved, provided accurate technical data, and identified most hazards correctly.	The group analyzed the scenario and the chemicals involved, presented accurate technical data, and accurately identified all hazards present at the scene described in their scenario, but were unable to defend their rationale for prioritization of the relative severity of hazards.	The group analyzed the scenario and the chemicals involved, estimated the potential hazards accurately, and made sound decisions related to the prioritization of the severity of the hazards.	/8 pts
Presentation	**Poor (2 points)**	**Fair (4 points)**	**Good (6 points)**	**Excellent (8 points)**	**Points**
Did the group present a clear, concise and accurate summary of hazard analysis information appropriate to their audience? Could group members answer questions posed by their audience regarding the chemicals and their hazards clearly and concisely?	Presentation was not clear. Information was not well organized. Group members were unable to answer questions.	Information was somewhat organized, but contained some inaccuracies, exaggerations, or excessive technical jargon, making details of the presentation inaccessible to their audience. Group members were able to answer some questions when asked by instructor or other students.	Information was very well organized. Group members were able to answer most questions posed by instructor and other students.	Presentation was of professional caliber. Information was extremely organized and easy to follow. Each individual group member was able to answer all questions from instructors and to justify their answers.	/8 pts
Group Collaboration	**Poor (1 point)**	**Fair (2 points)**	**Good (3 points)**	**Excellent (4 points)**	**Points**
Did group members contribute equally? Did group members effectively collaborate to achieve group objectives?	One or two members of the group did all the work. Some refused to participate or were not allowed to help.	One or two members of the group didn' t help complete tasks. Group was constantly covering for group members or not encouraging them to participate. Most members presented.	All group members worked on their own assignments. No one did more work than anyone else. Some communication, but mostly worked separately. All members presented	All group members worked on their assignments, but also collaborated frequently. Clear connection and communication between the group members. All members presented.	/4 pts
				Total Points	/20 pts