

EHS 101: Fundamentals of Chemistry for Environmental Health

UCLA School of Public Health

<https://ccle.ucla.edu/course/view/16F-ENVHLT101-1>

Syllabus – Fall 2017

Tuesdays, 1 - 2:50 pm, in 61-235 CHS

Course information

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Required Text

Fundamentals of Sustainable Chemical Science by Stanley Manahan
ISBN-10: 1439802394 | **ISBN-13:** 978-1439802397 (also available as a Kindle ebook, **ASIN:** B005H6YS9Q)

Course Description:

Env Hth 101 provides a guided tutorial on fundamental chemical concepts that are important for public health and is designed for students that either do not have a strong background in chemistry or who last took a chemistry class a long time ago and wish to have a refresher prior. Examples relevant to Environmental Health and Public Health more broadly will be discussed in each topic area and used to illustrate why understanding fundamental chemical concepts is important to our discipline. EHS 101 is **not** designed to be a substitute for the required introductory courses (e.g., EHS 100 or EHS C200A/B/C) but rather to be taken either concurrently with the first introductory course in the sequence (EHS C200A, EHS 200B or EHS 100) or prior to taking the required course.

ENV HTH 101, "Fundamentals of Chemistry for Environmental Health" will meet for two hours per week in Fall quarter. The format is an interactive seminar and discussion; the topics focus on core chemical concepts that. Env Hth 101 is available either for a letter grade or as S/U. Students in the MPH program who wish for Env Hth to count towards their degree requirements must take the course for a letter grade. All students (regardless of whether they are taking the course for a letter grade or as S/U) are expected to engage actively in the class discussions and problem solving sessions.

Course Website:

All homework assignments are posted on the course website: <https://ccle.ucla.edu/course/view/16F-ENVHLT101-1>

If you are unable to access the course website, please contact Michael Collins (mdc@ucla.edu).

Course Structure:

The class will meet for two hours as week; format is interactive seminar and discussion. Active participation is essential to success in this course. Please read all required reading prior to coming to each class. Reading Assignments are listed in the tentative course schedule found at the end of this syllabus; any updates will be posted on the course website. Homework Assignments must be submitted prior to the beginning of class via the course website on the date that they are due.

Learning Objectives and Competencies

Upon completion of this course, you should be able to demonstrate the skills listed as “Course Learning Objectives” below.

COURSE LEARNING OBJECTIVES

1. Accurately and effectively explain how core chemical concepts relate to important topics in Environmental and Public Health.
2. Use basic chemical concepts to solve problems related to Environmental and Public Health

HOW THIS COURSE ALIGNS WITH COMPETENCIES FOR SPECIFIC DEGREE PROGRAMS

MPH Core Competencies (for all MPH students)

- C1. Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents.
- F11. Articulate how biological, chemical, and physical agents affect human health.

EHS MPH Discipline-Specific Competencies (for MPH students in the EHS concentration)

- 11.1. Describe major direct and indirect human health and safety effects of major environmental or occupational agents or conditions.

EHS MS Competencies

- E4. Identify and implement appropriate safety controls and practices.

Course grading:

1. Homework Assignments 30%
2. Demonstrated Completion of EH&S Laboratory Safety Fundamental Concepts (LSFC) Workshop (or Online Refresher) 10%
3. Final Exam 30%
4. Participation 30%

Homework

Detailed homework assignments are posted on the course website under the week that they are due. **Homework assignments must be submitted via the course website prior to the beginning of class on the day that they are due.** There is no homework assignments due Week 1 (the first day of class).

EH&S Laboratory Safety Fundamental Concepts (LSFC) Workshop or Online Refresher

All students must submit a copy of the certificate/confirmation provided by UCLA's Environmental Health and Safety office that they have completed the EH&S Laboratory Safety Fundamental Concepts (LSFC) Workshop or Online Refresher during calendar year 2016 (i.e., sometime January-December 2016). **Proof of completion must be submitted via the course website prior to the beginning of class on the day that they are due.**

Initial Knowledge Assessment and Final Exam

The exam will contain problems similar (but not identical to) those on the homework assignments.

Class Participation:

The class meets two hours per week and is in the format of an interactive seminar. Active participation is essential to success in this course. **PLEASE MAKE SURE THAT YOU ARE IN CLASS ON TIME AND THAT YOU HAVE COMPLETED ALL REQUIRED READINGS PRIOR TO COMING TO CLASS. PLEASE COME TO CLASS READY TO LEARN AND BE ENGAGED.** Although you are allowed to use computers during class, we are relying on you to exercise restraint and not surf the web (or engage in other non-class activities online) during class.

Participation represents a large percentage of the class. The process will involve the assignment of different questions posed by the students and the instructor in any particular class to specific individuals who will look up the answer to the question and then report to the class what they have discovered in the beginning of the subsequent class.

Tentative Course Schedule (as of 10/20/16; subject to change)

Day	Topic & Primary Instructor	Reading Assignment (Please read prior to the class on the day specified)	Homework Assignment (must be submitted electronically via course website before the beginning of class on the day listed)
Week 1 (10/3/17)	General Introduction to Course <ul style="list-style-type: none"> - Overview of the course and subject area - Brief discussion of course organization issues - Syllabus, grading, introductions Introduction to Chemistry and Green Chemistry <ul style="list-style-type: none"> - Building Blocks of Matter - Chemical Notation - Measurements and Systems of Measurement - Temperature, Heat, and Energy - Pressure - Units and Dimensional Analysis 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 1 "Introduction to Chemistry and Green Chemistry"	NO HOMEWORK
Week 2 (10/10/17)	Matter and Materials <ul style="list-style-type: none"> - Classification of Matter - Physical Properties and States of Matter - Thermal Properties - Separation and Characterization 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 2 "Matter and Materials"	HOMEWORK #1
Week 3 (10/17/17)	Atoms and Elements <ul style="list-style-type: none"> - Atomic Theory and Structure of the Atom - Periodic Table & Periodicity of Properties - Energy levels & Electronic Configurations 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 3 "Atoms and Elements"	HOMEWORK #2

Day	Topic & Primary Instructor	Reading Assignment (Please read prior to the class on the day specified)	Homework Assignment (must be submitted electronically via course website before the beginning of class on the day listed)
Week 4 (10/24/17)	Chemical Bonds, Molecules, and Compounds <ul style="list-style-type: none"> - Chemical Bonding & Octet Rule - Ionic and Covalent Bonding - Chemical Formulas and Nomenclature - Intro to Acids, Bases & Salts 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 4 “Chemical Bonds, Molecules, and Compounds”	HOMEWORK #3
Week 5 (10/31/17)	Chemical Reactions, Equations, and Stoichiometry <ul style="list-style-type: none"> - Basics of Chemical Equations - Thermodynamics versus Kinetics - Classes of Chemical Reactions - Stoichiometry 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 5 “Chemical Reactions, Equations, and Stoichiometry”	HOMEWORK #4
Week 6 (11/7/17)	Acids, Bases and Salts <ul style="list-style-type: none"> - Nature of Acids, Bases & Salts - Dissolution, Dissociation and Conductance - pH and Buffers - Preparation and Nomenclature for Acids, Bases & Salts 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 6 “Acids, Bases and Salts”	HOMEWORK #5
Week 7 (11/14/17)	Solutions and Solvents <ul style="list-style-type: none"> - Introduction to Solutions & Solvents - Importance of Water to Life – Aqueous Solutions - Standard Solutions and Titrations - Physical Properties of Solutions - Equilibria - Colloids - 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 7 “Solutions and Solvents”	HOMEWORK #6

Day	Topic & Primary Instructor	Reading Assignment (Please read prior to the class on the day specified)	Homework Assignment (must be submitted electronically via course website before the beginning of class on the day listed)
Week 8 (11/21/17)	Chemistry and Electricity <ul style="list-style-type: none"> - Redox Reactions - Batteries - Using Electricity to Make Reactions Occur - Fuel Cells & Solar Cells - Reaction Tendency & Nernst Equation - Corrosion - 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 8 “Chemistry and Electricity”	HOMEWORK #7
Week 9 (11/28/17)	Organic Chemistry <ul style="list-style-type: none"> - Bonding and Geometries in Organic Compounds - Hydrocarbons - Functional Groups - Synthetic Polymers 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 9 “Organic Chemistry”	HOMEWORK #8
Week 10 (12/5/17)	Biological Chemistry <ul style="list-style-type: none"> - Biochemistry & Cells - Major Classes of Biomolecules - Recombinant DNA, PCR and Genetic Engineering - Metabolic Processes 	Manahan, <i>Sustainable Chemical Science</i> , Chapter 10 “Biological Chemistry”	HOMEWORK #9 LAST DAY TO SUBMIT CONFIRMATION OF COMPLETION OF EH&S LABORATORY SAFETY FUNDAMENTAL CONCEPTS WORKSHOP OR ONLINE REFRESHER VIA COURSE WEBSITE
Week 11 Finals Week	THE FINAL EXAM: Tuesday December 12th, 2017 from 11:30 am to 2:30 pm		

