

UNIVERSITY OF HOUSTON – CLEAR LAKE

ENVIRONMENTAL SCIENCES (ENSC) PROGRAM

INDH 4232

INDUSTRIAL HYGIENE SAMPLING AND ANALYSIS

SPRING 2015

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PREREQUISITES:

For INDH 4232, admission requirements to ENSC program.

COURSE DESCRIPTION:

Sampling and analysis for common occupational hazards, principles of equipment, calibration, and conduct of laboratory and field monitoring and analytical techniques. Four laboratory periods/exercises are included with written lab reports.

The course meets for up to 3 hours of lecture/lab each week on Monday evenings from 7:00 p.m. to 9:50 p.m. The assigned classroom is Room 3335 in the Bayou Building.

COURSE OBJECTIVES:

Enable student as follows: to become proficient in the evaluation of environmental hazards that may occur in the workplace; calibrate and use air sampling and industrial hygiene monitoring equipment; develop skills to define problems, conduct projects, and interpret occupational and environmental data; develop monitoring, analysis, and data management skills; develop skills to work effectively as an interdisciplinary technical team member; and be effective in written and oral risk communication.

TEXTBOOK AND REFERENCES:

Textbook – *The Occupational Environment: Its Evaluation, Control, and Management*. American Industrial Hygiene Association (AIHA). (2011)

http://webportal.aiha.org/Purchase/ProductDetail.aspx?Product_code=d1edd7dd-fe5c-df11-ba2b-005056810034

References:

Maslansky and Maslansky, *Air Monitoring Instrumentation*. Van Nostrand Reinhold (1993).

Plog, B.A.; Quinlan, P.J. (Eds), *Fundamentals of Industrial Hygiene*, Fifth Edition, National Safety Council (2002).

ACGIH *Air Sampling Instruments*, Ninth Edition (2001).

NIOSH Manual of Analytical Methods; <http://www.cdc.gov/niosh/nmam/>

NIOSH Pocket Guide to Chemical Hazards; <http://www.cdc.gov/niosh/npg/>

OSHA Sampling and Analytical Methods; <http://www.osha.gov/dts/sltc/methods/index.html>

COURSE GOALS AND OBJECTIVES – LEARNING OUTCOMES:

1. Review the principles of evaluating worker exposures including basic parameters of industrial hygiene and occupational exposure assessment.
2. Perform numerous methods of evaluation of identified hazards in the work environment involving airborne sampling techniques.
3. Investigate sampling procedures as well as laboratory analysis of potential workplace hazards involving gases and vapors and also particulates based on published methods.
4. Understand both theory and application of sampling parameters for a variety of types of occupational stressors.
5. Perform pump calibration exercises with available equipment and supplies to assist with implementation of a defined site sampling strategy.
6. Recognize and properly utilize defined direct-reading instruments for laboratory analysis of potential workplace environments to generate analytical data for assessment.
7. Compare pros and cons of sampling strategy and equipment selection criteria to best evaluate potential workplace exposures.
8. Complete a total of 4 separate laboratory exercises with appropriate quality control determinations.
9. Verify statistical assessment of laboratory analytical data to assist with proper result interpretation.
10. Prepare technical written report documentation for laboratory exercises.
11. Explore various control measures for assessment within occupational workplaces.
12. Understand applicable governmental regulations and their impact on the industrial hygiene field as well as the safety and health profession.

COURSE FORMAT:

Lectures, laboratory equipment demonstrations, problem solving, and performance of laboratory exercises with preparation of technical written reports. Preparation for tests is also anticipated through review and understanding of the class topics and conduct and completion of laboratory exercises.

ATTENDANCE AND GRADING POLICY:

Attainment of course objectives by students will be evaluated through the critique of assignments, completion of periodic examinations, and conduct of hands-on lab exercises to be familiar with instrumentation as well as data interpretation and technical documentation. Course attendance is required and participation will be specifically recorded. Each student is responsible for lecture, textbook, handout material, laboratory exercises as a team member, and assignments. The last day to drop the class without a grade penalty is April 14, 2015.

The final course grade will be calculated as outlined based on a 10-point scale; +/- system.

Grading Distribution:

1. Exams (Midterm and Final)	80%
(40% for each exam)	
2. Laboratory assignments	20%
includes class attendance	
and student participation	
	<hr/>
	100%

HONESTY CODE: “I will be honest in all my academic activities and will not tolerate dishonesty”. Details on the Honesty Policy are referenced in catalog for institution.

STUDENTS WITH DISABILITIES: If you are certified as disabled and are entitled to accommodation under the Americans with Disabilities Act, Section 503, please see the instructor as soon as possible. If you are not currently certified and believe you may qualify, please contact the UHCL Health and Disability Services office at (281) 283-2627.

INSTRUCTOR:

JK, Inc.
8926 Kirby Drive
Houston, TX 77054
(713) 664-1597 (8:00 am - 5:00 pm + + +)
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SPRING 2015 - CALENDAR

<u>DATES</u>	<u>WEEK</u>	<u>WEEKLY TOPIC DESCRIPTION</u>	<u>CHAPTER</u> <u>3rd EDITION (2nd)</u>
1/26/15	1	Introduction and Class Outline and Syllabus Principles of Evaluating Worker Exposure	Chapter 7 (7)
2/02/15	2	Preparation of Standards	Chapter 16 (14)
2/09/15	3	Statistics of Sampling and Evaluation Introduction and Initial Problem Sets	Chapter 13 (42)
2/16/15	4	Sampling Gases and Vapors Statistics Problems	Chapter 11 (10)
2/23/15	5	Calibration of Sampling Equipment Statistics Software: IHStat and Problems	Chapter 15 (13)
3/02/15	6	Airborne Particles Statistics Problems Course Review for Midterm	Chapter 14 (12)
3/09/15	7	Mid-Term Examination	
3/16/15	8	Spring Break	
3/23/15	9	Direct-Reading Instruments	Chapter 17 (15)
3/30/15	10	Gas and Vapor Analysis/Chromatography	Chapter 12 (11)

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4/06/15	11	LAB 1 Pump Calibration Total, Inhalable, and Respirable Particulates Asbestos Fiber Counts	
4/13/15	12	LAB 2 Analysis for Organic Vapors Gas Chromatography FID, MS	
4/20/15	13	LAB 3 Preparation of Standards (Gas Bags) Detector Tubes Portable Gas Detectors	
4/27/15	14	LAB 4 MIRAN Infrared Analyzer LogNorm2 XRF	
5/04/15	15	Lab Reports Due/Discussions Course Final Review	
5/11/15	16	Final Course Examination	

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CALENDAR OF IMPORTANT DATES

<u>DATE</u>	<u>WEEK</u>	<u>ACTIVITY</u>
3/02/15	6	Review for Mid-Term Exam
3/09/15	7	Mid-Term Examination
4/06/15	11	Start Lab Exercises (4 Sets)
4/13/15	12	Last Day to Drop Course
5/04/15	15	Lab Reports Due/Discussions Course Final Review
5/11/15	16	Final Course Examination

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LABORATORY EXERCISES

Students will work in groups (3-5) to conduct the following laboratory assignments that are worth 20% of final grade. Lab reports (one per group) are due on 5/04/2015.

Lab Exercise Topics:

1. Pump calibration
Total, Inhalable, and Respirable Particulates.
Asbestos fiber counts
2. Analysis for organic vapors
Gas chromatography FID and Mass Spectrometry (MS)
3. Preparation of standards (gas bags)
Detector tubes and portable gas detectors
4. MIRAN Infrared Analyzer and XRF
IHStat program

Anticipated course lab schedule and format:

	DATES			
	<u>04/06</u>	<u>04/13</u>	<u>04/20</u>	<u>04/27</u>
GROUP A	LAB 1	LAB 2	LAB 3	LAB 4
GROUP B	LAB 2	LAB 3	LAB 4	LAB 1
GROUP C	LAB 3	LAB 4	LAB 1	LAB 2
GROUP D	LAB 4	LAB 1	LAB 2	LAB 3