

**UNIVERSITY OF HOUSTON – CLEAR LAKE**

**ENVIRONMENTAL SCIENCES (ENSC) PROGRAM**

**INDH 4232**

**INDUSTRIAL HYGIENE SAMPLING AND ANALYSIS**

**FALL 2010**

**JAN KOEHN, M.S., CIH, INC.**

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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 equipment; develop skills to define problems, conduct projects, interpret occupational and environmental data; develop monitoring, analysis, and data management skills; develop skills to work effectively as an interdisciplinary 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). (2003)

<http://iweb.aiha.org/iweb/Purchase/ProductDetail.aspx?Product code=BIHT03-566>

#### 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 efforts.
11. Explore various control measures for assessment within occupational workplaces.
12. Understand applicable governmental regulations and their impact on the industrial hygiene field.

## **COURSE FORMAT:**

Lectures, laboratory exercise demonstrations, problem solving, and performance of laboratory exercises with technical written reports. Preparation for tests is also anticipated through review and understanding of the class topics and 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 and data interpretation and technical documentation. Course attendance is required and participation will be specifically recorded. Each student is responsible for lecture, textbook, handout material and assignments. The last day to drop the class without a grade penalty is October 26, 2010.

**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 on pages 77-80 in the 2010-2011 catalog.

**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 + + +)  
(713) 664-6443 (fax)  
[mail@jkinc.biz](mailto:mail@jkinc.biz)

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**FALL 2010 - CALENDAR**

<u>DATES</u>	<u>WEEK</u>	<u>WEEKLY TOPIC DESCRIPTION</u>
8/23/10	1	Introduction and Class Outline and Syllabus Principles of Evaluating Worker Exposure Chapter 7
8/30/10	2	Preparation of Standards Chapter 14
9/06/10	3	Holiday
9/13/10	4	Statistics of Sampling and Evaluation Chapter 42 Introduction and Initial Problem Sets
9/20/10	5	Sampling Gases and Vapors Chapter 10 Statistics Problems
9/27/10	6	Calibration of Sampling Equipment Chapter 13 Statistics Software: LogNorm2 and Problems
10/04/10	7	Airborne Particles Chapter 12 Statistics Problems Course Review for Midterm
10/11/10	8	Mid-Term Examination

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<u>DATES</u>	<u>WEEK</u>	<u>WEEKLY TOPIC DESCRIPTION</u>
10/18/10	9	Direct-Reading Instruments Chapter 15
10/25/10	10	Gas and Vapor Analysis/Chromatography Chapter 11
11/01/10	11	LAB 1 Pump Calibration Total, Inhalable, and Respirable Particulates Asbestos Fiber Counts
11/08/10	12	LAB 2 Analysis for Organic Vapors Gas Chromatography FID, MS
11/15/10	13	LAB 3 Preparation of Standards (Gas Bags) Detector Tubes Portable Gas Detectors
11/22/10	14	LAB 4 MIRAN Infrared Analyzer LogNorm2 XRF
11/29/10	15	Lab Reports Due/Discussions Course Final Review
12/06/10	16	Final Course Examination

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**CALENDAR OF IMPORTANT DATES**

<u>DATE</u>	<u>WEEK</u>	<u>ACTIVITY</u>
10/04/10	7	Review for Mid-Term Exam
10/11/10	8	Mid-Term Examination
10/26/10	10	Last Day to Drop Course
11/01/10	11	Start Lab Exercises (4 Sets)
11/29/10	15	Lab Reports Due/Discussions Course Final Review
12/06/10	16	Final Course Examination

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**LABORATORY**

Students will work in small groups (3-5) to conduct the following laboratory assignments that are worth 20% of final grade. Lab reports (one per group) are due on 11/29/2010. Exercises:

1. Pump calibration  
Total, Inhalable, and Respirable Particulates.  
Asbestos fiber counts
2. Analysis for organic vapors  
Gas chromatography FID, MS
3. Preparation of standards (gas bags)  
Detector tubes and portable gas detectors
4. MIRAN Infrared Analyzer and XRF  
LogNorm2

Anticipated course lab schedule and format:

	<b>DATES</b>			
	<b><u>11/01</u></b>	<b><u>11/08</u></b>	<b><u>11/15</u></b>	<b><u>11/22</u></b>
<b>GROUP A</b>	LAB 1	LAB 2	LAB 3	LAB 4
<b>GROUP B</b>	LAB 2	LAB 3	LAB 4	LAB 1
<b>GROUP C</b>	LAB 3	LAB 4	LAB 1	LAB 2
<b>GROUP D</b>	LAB 4	LAB 1	LAB 2	LAB 3