SSPPH 563: Chemical and Biological Hazard Control (Fall 2017)

Course Outline

Class Times	Labs and lectures: Friday 9am to 10am and 2pm to 4pm
Location	Room 143 and Main Laboratory (Rm. 369), SPPH
Instructor	Hind Sbihi, 370A LPC; hind.sbihi@ubc.ca
Teaching Assistant	Matthew Wagstaff (TA hours TBD); matthew.wagstaff@me.com

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Objectives

The purpose of this course is to teach second-year OEH students from a variety of backgrounds the technical aspects of exposure controls, e.g., ventilation, administrative and personal protective equipment. Additionally the course will also emphasize the importance of administrative controls in support of a comprehensive exposure management program.

Upon completion of this course, the student should be able to:

1. Apply hazard-ranking strategies to workplace and environmental exposure scenarios;
2. Describe the criteria for specifying respiratory protection based on appropriate protection factors;
3. List the elements and evaluation of a comprehensive respiratory protection program;
4. Describe criteria for selecting chemical or biological protective clothing;
5. Understand how to evaluate, select and implement administrative controls;
6. Compute exposure estimates for well-mixed rooms involving dilution ventilation and constant inputs;
7. Effectively interact with ventilation engineers to guide the design and operation of control measures;
8. Describe the function of HVAC components used for building ventilation;
9. Describe the role of HVAC in indoor air quality and infection control for health care settings;
10. Measure the flow characteristics of a ventilation system and apply this data for system diagnostics;
11. Select the appropriate type of local exhaust hood for controlling workplace exposures;
12. Compute exposure estimates for a dilution ventilation situation with variable input conditions;
13. Explain principles of fluid mechanics that apply to flow of air or liquids in building ducting and piping systems; describe fluid measurements in terms of pressure drop, flow rate, and velocity;
14. Estimate friction losses for flow through ducts or pipes using standard tables;
15. Design and specify the components of a single-branch local exhaust ventilation system;
16. Design and specify the components of a multiple branch local exhaust ventilation system; and
17. Understand the application of fan laws and system effects to local exhaust ventilation systems.

Course Format and Communication

The technically oriented course material will primarily focus on ventilation and personal protective equipment in the occupational environment. This format will include labs to provide opportunities to apply measurement techniques and instruments used in real world settings. Several field trips to will acquaint students with industrial processes, control systems, and their occupational and environmental impacts.

There will be guest lectures that will provide examples of industrial applications of the control measures we will be studying and other new topics.

Classes will include many formats: discussion of focused questions about the readings, discussion of assignments, lectures, labs, and field trip. Regular readings will be provided.

Course lectures, labs, assignments and announcements will be posted on CONNECT.

Evaluation

Evaluation for grading purposes will be based on

Labs due 7-10 days after they take place:
Lab 1 - 8%; due September 25
Lab 2 - 8%; due October 9
Lab 3 - 12%; due November 6
Lab 4 -12%; due November 20
Lab 5- 15%; due December 4

Final Exam – 25%; (December 8th)

Assignments (5) are worth 15% of your final mark - they are due the beginning of the next class (1 week). **Late Assignments will be reviewed but not graded**
Participation – 5% - in class and during labs. Details will be provided in the first lecture. Class participation will be judged by instructor(s) and TA

The grade for the labs and assignments will reflect your

- demonstrated understanding of the course material,
- critical appraisal of ideas,
- development of innovative and effective solutions to problems, and
- **clear and detailed explanation of the above in your responses. A correct response and no explanation will not receive full marks**

The answers to some assignment questions will be discussed during the class when the assignment is due. Because of this, I will not be able to accept late assignments.

- A+ (≥ 90%) is only rarely given (i.e., most years, it is not achieved by any student); it requires completion of and excellence in all core elements, evidence of critical thinking and innovation above and beyond expectations, and consistent attention to detail.
- A (85-89%)suggests there is a very high level of quality throughout every aspect of your work. Work deserving of an A is distinguished in virtually every aspect. It shows the individual (or group) has gone well beyond what has been provided and has extended the usual ways of thinking and/or performing. Outstanding comprehension of subject and use of existing literature and research. Excellent application of learning-centred methodology and contemporary pedagogical principles (e.g., self-directed learning progressions). Consistently integrates critical and creative perspectives toward subject material. Shows a very high degree of engagement with the topic.
- A- (80-84%), suggests there is generally a high quality throughout your work, no problems of any significance, and evidence of attention given to each criterion. Very good comprehension of subject and use of existing literature and research. Very good application of learning-centred methodology and contemporary pedagogical principles (e.g., self-directed learning progressions). For the most part, integrates critical and creative perspectives toward subject material. Shows a high degree of engagement with the topic
- B range (68-79%) This category of achievement is typified by adequate but unexceptional performance when the criteria of assessment are considered. It is distinguished from A level work by problems such as: One of more significant errors in understanding, superficial representation or analysis of key concepts, absence of any special initiatives, or lack of coherent organization or explanation of ideas.
  The level of B work is judged in accordance with the severity of the difficulties demonstrated. B+ is from 76% to 79%, B is from 72% to 75%, and B- is from 68% to 71%
- C (≤68) essentially a failing grade in graduate school

Withdrawal Deadlines

Without a W on your transcript: Tuesday, September 19, 2017

With a W instead of an F on your transcript: Friday, October 13, 2017

Academic Dishonesty

Please review the UBC Calendar "Academic regulations" for the university policy on plagiarism, cheating, and other forms of academic dishonesty. Working together and discussing ideas is encouraged and in many cases required, however copying assignments will not be tolerated.

Late Policy

Assignments are due at the beginning of class, late assignments will be reviewed but receive a zero grade.

Labs will be accepted up to 1 week after their due date but will also be assessed a 10% reduction in grade. Labs received after one week will be reviewed but not graded.

Useful Texts

Perkins JL. Modern Industrial Hygiene, Vol. 3. ACGIH Press 2012. ISBN 978-1-607260-47-9 ***(Required)***

ACGIH. 2014 TLVs and BEIs Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH: American Conference of Governmental Industrial Hygienists, 2014

ACGIH. Industrial Ventilation, A Manual of Recommended Practice, 26th Edition, Cincinnati, OH: American Conference of Governmental Industrial Hygienists, 2007 ***a,b (or latest edition)***

ASHRAE. ASHRAE Handbooks. Atlanta: American Society of Heating, Refrigeration and Air-conditioning Engineers, 2004 ***a (or latest 'Fundamentals' edition)***

Burgess WA. Recognition of Health Hazards in Industry: A Review of Materials and Processes, 2nd Edition. New York: John Wiley and Sons, 1995 WA 400 B87 1995 ***a***

Burgess WA, Ellenbecker MJ, Treitman RD. Ventilation for Control of the Work Environment, 2nd Edition New York: Wiley Interscience, 2004 ***b***

Harrington JM and Gardiner K. Occupational Hygiene, 2nd Edition. Oxford: Blackwell Science, 1995 WA 440 023 1995 ***a,b***

ILO. Encyclopedia of Occupational Health and Safety, Fourth Edition. Geneva: International Labour Office, 1998. ***a,b***

Plog BA, Niland J, Quinlan PJ, editors. Fundamentals of Industrial Hygiene, 4th edition. Itasca, IL: National Safety Council, 1996 WA 400. F85 ***a,b***

Roach SA. Health Risks from Hazardous Substances at Work: Assessment, Evaluation and Control. Oxford: Pergamon Press, 1992 T 55.3 H3 R63 1992 ***a,b***

a available at Woodward Library ***b*** available in OEH library

Other Resources:

McDermott, Handbook of Ventilation for Contaminant Control, 3rd Edition.

Woodside, Environmental, Safety, and Health Engineering. Environmental, Safety, and Health Engineering by Gayle Woodside, Dianna Kocurek. Contains principles of environmental engineering, safety engineering and industrial hygiene/occupational health engineering. ISBN: 0471109320, New York, John Wiley 1997

Biological Risk Engineering Handbook (BREH): Infection Control and Decontamination, by Martha J Boss. Publisher: CRC; 1st edition (November 25, 2002) ISBN: 1566706068

Personal Protective Equipment Pocket Guide, Genium Publishing Corporation ISBN: 0-931690-73-0 Copyright © 1995 64 pages This employee guidebook explains OSHA's personal protective equipment standard and how to comply. It also includes forms employees can use to document their comprehension of their PPE responsibilities.

Respirator Pocket Guide Genium Publishing Corporation ISBN: 0-931690-81-1 Copyright © 1995 64 pages This guide explains and helps workers understand the importance of regulatory issues, how respirators are designed to handle differing airborne hazards, and details basic equipment use and maintenance.

OSHA Publication 3151, Personal Protective Equipment, 46 pp, (Revised 2004); OSHA publication #3079, Respiratory Protection, 44pp, (Revised 2002); OSHA Small Entity Compliance Guide for Respiratory Protection Standard (CFR 1910.134), 149pp.