# University of Minnesota — School of Public Health

## PubH 6193
## Advanced Topics in Human Exposure Science
### Course Syllabus

## Fall 2017

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| **Credits:** | 2 |
| **Meeting Days:** | Wednesdays and Fridays, 2nd half of the Semester (October 25 to December 13, 2017) |
| **Meeting Time:** | 12:20- 2:15 PM |
| **Meeting Place:** | Mayo Bldg, Room 1250 |
| **Instructor:** | Susan Arnold |
| **Office Address:** | 1239 Mayo |
| **Office Phone:** | 612.624.6222 |
| **Fax:** | 612.626.4837 |
| **E-mail:** | arnol353@umn.edu |
| **Office Hours:** | by appointment:  please email or call |

## I.    Course Description

This course will develop the skills for designing exposure studies applicable to industrial hygiene decision-making for risk management, epidemiologic investigations and health risk assessments.  The course teaches a variety of techniques that can be used to measure or estimate human exposures to hazardous agents.

## II.   Course Prerequisites

The topics course taught by Dr. Raynor, "Measurement and Properties of Air Contaminants" is required.  PUBH 6103, "Exposure to Environmental Hazards," is recommended but not required.

## III.  Course Goals and Objectives

Upon completion of this course, students will be able to:
- Understand the nature of exposure problems in occupational and non-occupational environments.
- Understand principles and methodologies of exposure analysis.
- Develop effective exposure assessment strategies for industrial hygiene decision-making, epidemiologic and health risk assessment.
- Understand the sources and nature of variability in worker exposure data.
- Be proficient in the use of mathematical models for quantifying exposures.
- Be able to select proper techniques to measure or estimate exposures.

**IV. Methods of Instruction and Work Expectations**

We believe that your learning is enhanced when the goals and objectives of the course are clear; when assignments are directly connected to these goals; when you are actively involved as a learner by experiencing many different teaching/learning approaches, in class and out; and when you receive frequent feedback on how well you are learning. We will do our best to meet these conditions.

**You have responsibilities too:** 1) to come to class regularly; 2) to do all the reading—and to reflect on it—prior to the appropriate class; 3) to be prepared for regular assignments on the factual and conceptual material (i.e., the larger themes) of the course; 4) to hand in all assignments on time; 5) to interact with others openly and respectfully; and 6) to ask questions about what you do not understand, of your colleagues and/or the instructors.

**Approach:** The course uses a combination of lectures, discussions, homework assignments, and case studies to present and integrate the relevant material.

**V. Course Text and Readings**

The required text (*Occupational Exposure Assessment for Air Contaminants*, Gurumurthy Ramachandran, CRC Press, 2005) and course packet (from bookstore).

Guest Faculty:

Kimberly Anderson, PhD, Assistant Professor, UMN SPH

## VII. Evaluation and Grading

The course will consist of 7 problem sets (75% of course grade) and a final paper/presentation (25% of course grade). The final grade will consist of the highest 6 grades of the problem sets (i.e., lowest problem set score dropped), so each problem set has a final weight of 12.5%. Problem sets are due 1 week after they are assigned, and the final assignment, is due by the end of the semester.

This course can only be taken for a grade. Letter grades (and % associated with each grade) awarded in this course are as follows below, and will appear on your official transcript.

| A | Represents achievement that is outstanding relative to the level necessary to meet course requirements. (93-100 %) |
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| A- | (90-92 %) |
| B+ | (87-89 %) |
| B | Represents achievement that is significantly above the level necessary to met course requirements. (83-86 %) |
| B- | (80-82 %) |
| C+ | (77-79 %) |
| C | Represents achievement that meets the course requirements in every respect. (73-76 %) |
| C- | (70-72 %) |
| D+ | (67-69 %) |
| D | Represents achievement that is worthy of credit even though it fails to meet fully the course requirements. |
| F | Represents failure and signifies that the work was completed but not at a level of achievement worthy of credit or work that was not completed and there was no agreement between the instructor and the student that the student should be awarded an "I". |

### Incomplete Contracts

An instructor can assign a grade of incomplete, "I," when, due to extraordinary circumstances the student was prevented from completing the work of the course on time. The assignment of an "I" requires that a contract be initiated and completed by the student before the last day of class, and signed by both the student and the instructor. For more information and to initiate an incomplete contract, student should go to www.sph.umn.edu/grades.

### University of Minnesota Uniform Grading and Transcript Policy
A link to the policy can be found at onestop.umn.edu.

## VIII. Other Course Information and Policies

### Grade Option Change (if applicable)
For full-semester courses, students may change their grad option, if applicable, through the second week of the semester. Grade option change deadlines for other terms (i.e. summer and half-semester) can be found at onestop.umn.edu.

### Course Withdrawal
Students should refer to the Refund and Drop/Add Deadlines for the particular term at onestop.umn.edu for information and deadlines for withdrawing from a course. As a courtesy, students should notify their instructor and, if applicable, advisor of their intent to withdraw.

Students wishing to withdraw from a course after the noted final deadline for a particular term must contact the School of Public Health Student Services Center at sph-ssc@umn.edu for further information.

### Student Conduct, Scholastic Dishonesty and Sexual Harassment Policies
Students are responsible for knowing the University of Minnesota, Board of Regents' policy on Student Conduct and Sexual Harassment found at www.umn.edu/regents/polindex.html.

Students are responsible for maintaining scholastic honesty in their work at all times. Students engaged in scholastic dishonesty will be penalized, and offenses will be reported to the Office of Student Academic Integrity (OSAI, www.osai.umn.edu).

The University's Student Conduct Code defines scholastic dishonesty as "plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis."

Plagiarism is an important element of this policy. It is defined as the presentation of another's writing or ideas as your own. Serious, intentional plagiarism will result in a grade of "F" or "N" for the entire course. For more information on this policy and for a helpful discussion of preventing plagiarism, please consult University policies and procedures regarding academic integrity: http://writing.umn.edu/tww/plagiarism/.

Students are urged to be careful that they properly attribute and cite others' work in their own writing. For guidelines for correctly citing sources, go to http://tutorial.lib.umn.edu/ and click on "Citing Sources".

In addition, original work is expected in this course. It is unacceptable to hand in assignments for this course for which you receive credit in another course unless by prior agreement with the instructor. Building on a line of work begun in another course or leading to a thesis, dissertation, or final project is acceptable.

If you have any questions, consult the instructor.

**Disability Statement**

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have a documented disability (e.g., physical, learning, psychiatric, vision, hearing, or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact Disability Services to have a confidential discussion of their individual needs for accommodations.  Disability Services is located in Suite180 McNamara Alumni Center, 200 Oak Street. Staff can be reached by calling 612/626-1333 (voice or TTY).

| Week | Date | Faculty | Topic(s) | Prob Set | Reading |
|------|------|---------|----------|----------|---------|
| 1 | **25-Oct** | Susan | Basic Principles/Framework; Exposure Factors and Classification; Pathways: Inhalation/Ingestion/Dermal; Multipathway exposure | 1 | Occupational Exposure Assessment for Air Contaminants Chapter 15, pp. 237 – 245 |
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| | **27-Oct** | Susan | Exposure Variability. Lognormal distributions, GM, GSD, log probability plots, Relative importance of sampling/analytical variability and environmental variability. Exceedance fractions, the 95th percentile and its upper confidence limit, and its relevance. Arithmetic mean and its relevance; (IHSTAT spreadsheet) Between and within individual variability and their estimation; | | Occupational Exposure Assessment for Air Contaminants Ch. 15, pp. 245 - 250 |
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| 2 | **1-Nov** | Susan | Occ EA strategies: observational, sampling and hybrid approaches; assessing performance of different EA strategies (use of BS Simulator program) Occupational exposure limits. | 2 | Occupational Exposure Assessment for Air Contaminants Ch. 16, pp 259 - 277 |
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| | **3-Nov** | Susan | AIHA strategy – basic characterization, creating SEGs, defining and judging exposure profiles, decision-making | | A Strategy for Assessing and Managing Occupational Exposures Ch. 1 - 5 |
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| 3 | **8-Nov** | Susan | Assessing acceptability of an exposure scenario, estimating the 95th percentile of small data sets; professional judgment in exposure assessment | 3 | Ch. 15 pp 250 – 258, Ch. 16 pp 259 – 277 |
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| | **10-Nov** | Susan | Bayesian decision-making in exposure assessment - 1 | | |
| 4 | **15-Nov** | Susan | Bayesian 2 - Rules of thumb to qualitatively assess exposures using basic characterization information. (Checklist Tools) Watch video relating to class project (iron foundry exposure | 4 | Assessing and Managing Occupational Exposures 4th Edition, Ch. 6 and 26 |

| | | | scenarios – phenol and respirable dust) | | |
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| | **17-Nov** | Susan Kim | Modeling Air Exposures, Indoor Models – WMR, mass balance, steady state; Computational Fluid Dynamics Modeling | | Occupational Exposure Assessment for Air Contaminants, Ch. 17 pp 279 - 292 |
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| **5** | **22-Nov** | Susan | Near-field far-field model, small spill models, turbulent eddy diffusion models, steady state | 5 | |
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| | **24-Nov** | No Class | **THANKSGIVING BREAK** | | |
| **6** | **29-Nov** | Susan | Modeling exposures, continued | 6 | |
| | **1-Dec** | Susan | Monte Carlo simulations and uncertainty analysis in modeling: Theory and occupational application. Use models to evaluate iron foundry scenarios | | Occupational Exposure Assessment for Air Contaminants, Ch. 17 pp 292 - 297 |
| **7** | **6-Dec** | Susan | Scenario analysis – Iron foundry case study. Decision-making using basic characterization information, using models, and using monitoring data | 7 | |
| | **8-Dec** | Susan | Class Project (work together) Work together on project Scenario analysis – Iron foundry case study. Decision-making using basic characterization information, using models, and using monitoring data | | |
| **8** | **13-Dec** | Susan | PEL's and TLV's Final Assignment/Critical Review of 5 papers | | |