

**PubH 6193**  
**Advanced Topics in Human Exposure Science**  
**Course Syllabus Fall 2015**

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**Credits:** 2  
**Meeting Days:** Wednesdays and Fridays, 2<sup>nd</sup> half of the Semester (October 28 to December 16, 2015)  
**Meeting Time:** 12:20- 2:15 PM  
**Meeting Place:** Mayo Building 1250  
**Instructor:** Gurumurthy Ramachandran  
**Office Address:** 1205 Mayo  
**Office Phone:** 612.626.5428  
**Fax:** 612.626.4837  
**E-mail:** ramac002@umn.edu  
**Office Hours:** by appointment: please email or call

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**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 course taught by Dr. Ramachandran, PubH 6192, "Measurement and Properties of Air Contaminants" is required, unless waived by the instructor. 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

I 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. I will do my 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:

Bruce Alexander, Ph.D, EnHS, UM SPH

John Mulhausen, Ph.D, 3M Corporation

Susan Arnold, Ph.D., EnHS, UM SPH

## VI. Course Outline/Weekly Schedule

Week	Date	Faculty	Topic(s)
1	28-Oct	Ram	Exposure Variability. Lognormal distributions, GM, GSD, log probability plots, Relative importance of sampling/analytical variability and environmental variability.
	30-Oct	Ram	Exceedance fractions, the 95 <sup>th</sup> percentile and its upper confidence limit, and its relevance. Arithmetic mean and its relevance; (IHStat spreadsheet)
2	4-Nov	Ram	Between and within individual variability and their estimation; Occ EA strategies: observational, sampling and hybrid approaches; assessing performance of different EA strategies (use of BS Simulator program)
	6-Nov	Ram	Occupational exposure limits. AIHA strategy – basic characterization, creating SEGs, defining and judging exposure profiles, decision-making
3	11-Nov	Susan	Rules of thumb to qualitatively assess exposures using basic characterization information. Watch video relating to class project (iron foundry exposure scenarios – phenol and respirable dust)
	13-Nov	Ram	Modeling Air Exposures, Well mixed room, mass balance, steady state
4	18-Nov	Mulhausen	Bayesian decision-making in exposure assessment
	20-Nov	Mulhausen	Assessing acceptability of an exposure scenario, estimating the 95 <sup>th</sup> percentile of small data sets; professional judgment in exposure assessment
5	25-Nov	Ram	Near-field far-field model, small spill models, turbulent eddy diffusion models
	27-Nov	<b>NO CLASS</b>	<b>THANKSGIVING BREAK</b>
6	2-Dec	Bruce Alexander	Exposure assessment and occupational epidemiology
	4-Dec	Ram	Monte Carlo simulations and uncertainty analysis in modeling: Theory and occupational application. Use models to evaluate iron foundry scenarios
7	9-Dec	Ram	Scenario analysis – Iron foundry case study. Decision-making using basic characterization information, using models, and using monitoring data
	11-Dec	<b>Class</b>	<b>Work together on project</b> Scenario analysis – Iron foundry case study. Decision-making using basic characterization information, using models, and using monitoring data
8	16-Dec	Ram	PEL's and TLV's Final Assignment/Critical Review of 5 papers.

## VII. Evaluation and Grading

The course will consist of 4 problem sets (20% of course grade), a critical review of the literature (20%) and a final project (60% of course grade). 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 %)
A-	(90-92 %)
B+	(87-89 %)
B	Represents achievement that is significantly above the level necessary to meet 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](http://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](http://onestop.umn.edu).

## VIII. Other Course Information and Policies

### Grade Option Change (if applicable)

For full-semester courses, students may change their grade option, if applicable, through the second week of the semester. Grade option change deadlines for other terms (i.e. summer and half-semester courses) can be found at [onestop.umn.edu](http://onestop.umn.edu).

### Course Withdrawal

Students should refer to the Refund and Drop/Add Deadlines for the particular term at [onestop.umn.edu](http://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 Office of Admissions and Student Resources at [sph-ssc@umn.edu](mailto:sph-ssc@umn.edu) for further information.

### Student Conduct Code

The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see:

[http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf).

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

### **Use of Personal Electronic Devices in the Classroom**

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference:

<http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

### **Scholastic Dishonesty**

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means 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; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code:

[http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf)) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see:

<http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html>.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: <http://www1.umn.edu/oscai/integrity/student/index.html>. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

### **Makeup Work for Legitimate Absences**

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see:

<http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html>.

### **Appropriate Student Use of Class Notes and Course Materials**

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: <http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

### **Sexual Harassment**

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy:

<http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf>

### **Equity, Diversity, Equal Opportunity, and Affirmative Action**

The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: [http://regents.umn.edu/sites/default/files/policies/Equity\\_Diversity\\_EO\\_AA.pdf](http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf).

### **Disability Accommodations**

The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DS website, <https://diversity.umn.edu/disability/>.

### **Mental Health and Stress Management**

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: <http://www.mentalhealth.umn.edu>.

### **Academic Freedom and Responsibility: *for courses that do not involve students in research***

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.\*

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost. *[Customize with names and contact information as appropriate for the course/college/campus.]*

**\* Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".**