

## QBS 136: Applied Epidemiological Methods I

**PROFESSOR:** Annie Hoen, PhD

**COURSE OBJECTIVES:** The major goal of this course is to provide hands-on experience performing epidemiological data analyses. Specifically, we aim to complement the theoretical/conceptual material presented in Foundations of Epidemiology I. This is a computer laboratory-based course. Using epidemiological study data, students will be guided through descriptive data analyses, hypothesis testing within the context of a range of epidemiological study designs, causal inference methods, and addressing confounding and effect modification. Additional goals include engaging in the practice of reading primary literature. **Substantial emphasis will be placed on learning to develop figures, tables and text for scientific publications and on honing scientific oral presentation skills.**

**LEARNING METHODS:** Readings from primary epidemiological literature will be assigned to familiarize students with the presentation of analytic results. In-class activities will include self-paced exploration of epidemiological data sets with written prompts guiding students through descriptive and/or hypothesis-driven analyses and *ad hoc* discussions and demonstrations. Each weekly exercise will culminate with the development of one or more **publication-quality** tables and/or figures upon which grades will be assigned. At the end of the term, each student will complete an independent project and deliver the results to the class in a 5 to 10-minute oral presentation.

### **STUDENT EXPECTATIONS:**

1. Complete all assigned readings in advance of each session
2. Attend all sessions
3. Actively participate by working through exercises, engaging in in-class discussion, asking questions of your professor, teaching assistant and assisting colleagues when you are able
4. Stay focused during and refrain from off-topic conversation in class
5. Turn in assignments on time
6. Keep track of course activities, announcements, and course materials via our Canvas site
7. Seek help from the Professor or teaching assistant when needed
8. Communicate with the professor, **in advance whenever possible**, if extenuating circumstances preclude your attendance or on-time submission of graded material

### **PROFESSOR EXPECTATIONS:**

1. Be organized and prepared throughout the course
2. Explain material clearly and efficiently
3. Answer student questions thoroughly
4. Be available for consultations regarding course material and assessments outside of class
5. Use evaluation methods that provide a representative test of student knowledge and understanding of the course material
6. Grade student work fairly and promptly

### **TEACHING ASSISTANT EXPECTATIONS:**

1. Master course material
2. Grade student work fairly and promptly
3. Provide assistance with course material
4. Serve as a liaison between students and professor

**REQUIREMENTS & GRADING:** Final grades will be based on weekly assignments (80%) and final in-class presentations (20%). Late assignments will be penalized 10% for each 24-hour period (or part thereof). Assignments will focus on the production of publication-quality figures and tables that demonstrate (1) mastery of epidemiological concepts; (2) computational and data analysis skills; and (3) sound interpretation of results. **Tables should have complete, descriptive titles and footnotes when appropriate. Figures should be accompanied by titles and descriptive legends. Figures, tables, titles and legends should be written**

and formatted in accordance with journal conventions.

**WEEKLY AGENDA:**

Date	Topic	Reading assignment	Assignment # (due date*)
Sept 16	Introduction to R, data structures, graphics	Callaghan <i>et al</i> 2013; Ahn <i>et al</i> 2014	1 (Sept 23)
Sept 23	Data cleaning and exploration, distributions, variable transformation and missing data, prevalence and incidence	Brumpton <i>et al</i> 2015; Hayashi <i>et al</i> 2016	2 (Sept 30)
Sept 30	Age-specific incidence rates	Manzi <i>et al</i> 2009; Wallace <i>et al</i> 1998	3 (Oct 7)
Oct 7	Time-to-event analysis	Hochman <i>et al</i> 2001; The Digitalis Investigation Group 1997	4 (Oct 14)
Oct 14	Geospatial analysis	Kulldorff <i>et al</i> 1997; Jemal <i>et al</i> 2002	5 (Oct 21)
Oct 21	Bivariate comparisons with t-test, chi-square test, odds ratio	Cruickshanks <i>et al</i> 1998; Gostynski <i>et al</i> 2004	6 (Oct 28)
Oct 28	Descriptive data analysis in preparation for final project		
Nov 4	Logistic regression, confounding	DeStefani <i>et al</i> 1990; Lee <i>et al</i> 2005	7 (Nov 11)
Nov 11	Linear regression, stratification, effect modification	Cournot <i>et al</i> 2006	8 (Nov 18)
Nov 18	Final project presentations		Slides due by 11:00 am Nov 18

\*Note: assignments are due before the start of class on the due date

**RESOURCES:** There is no required text for this course, but the following books and other resources may be helpful:

- R mailing lists at <http://www.r-project.org/mail.html>
- *The R Book*, 2nd Edition by Michael J. Crawley (available in print and as eBook online)
- *Statistical Models in Epidemiology* by David Clayton and Michael Hills
- *Biostatistics for Epidemiology and Public Health Using R* by Bertram K. C. Chan
- *Presenting Medical Statistics from Proposal to Publication* by Janet L. Peacock, Sally M. Kerry and Raymond R. Balise

**DISABILITIES:** Students requiring disability-related academic adjustments and services must consult the Student Accessibility Services (SAS) office in Carson Hall 125 or by phone: 646-9900 or email: Student.Accessibility.Services@Dartmouth.edu. Once SAS has authorized services, students must show the originally signed SAS Services and Consent Form and/or a letter on SAS letterhead to the course director. If you have questions about whether you qualify to receive academic adjustments and services, you may contact the SAS office. All inquiries and discussions will remain confidential. Students are always encouraged to speak with me about what I can do to make this course more inclusive and accommodating to those with disabilities.

**DIVERSITY AND INCLUSION:** I aim to create a learning environment that supports a diversity of thoughts,

perspectives and experiences, and honors identity (including race, gender, class, sexuality, religion, ability, etc.). If there is anything I can do to help foster an inclusive environment in class, please do not hesitate to let me know.

**SEXUAL MISCONDUCT:** At Dartmouth, we value integrity, responsibility, and respect for the rights and interests of others, all central to our Principles of Community. We are dedicated to establishing and maintaining a safe and inclusive campus where all have equal access to the educational and employment opportunities Dartmouth offers. We strive to promote an environment of sexual respect, safety, and well-being. In its policies and standards, Dartmouth demonstrates unequivocally that sexual assault, gender-based harassment, domestic violence, dating violence, and stalking are not tolerated in our community.

The Sexual Respect Website ([sexual-respect.dartmouth.edu](http://sexual-respect.dartmouth.edu)) at Dartmouth provides a wealth of information on your right with regard to sexual respect and resources that are available to all in our community. ***It is important that you know that as a faculty member, I am obligated to share disclosures regarding conduct under Title IX with Dartmouth's Title IX Coordinator.***

Should you have any questions, please feel free to contact Dartmouth's Title IX Coordinator (Kristi.Clemens@Dartmouth.edu) or the Deputy Title IX Coordinator for Geisel (Leslie.Henderson@Dartmouth.edu) or for Guarini (Gary.Hutchins@Dartmouth.edu).

**WELLNESS:** Resources are available to assist you with caring for your physical and emotional health, including the Dartmouth College Health Service (<https://students.dartmouth.edu/health-service/>), the Counseling Center (<http://www.dartmouth.edu/~chd/>) and the Student Wellness Center (<http://www.dartmouth.edu/~healthed/>). I encourage you to make your health and wellness your top priority and to take care of yourself throughout the term.

If your performance in the class is being impacted by your experiences outside of class, please don't hesitate to talk with me.

**RELIGIOUS OBSERVANCES:** If you have a religious observance that conflicts with your participation in the course, please meet with me as soon as possible to discuss appropriate accommodations.

**HONOR PRINCIPLE:** Honesty is the foundation of the academic pursuit of knowledge. In recognition of this, the faculty will not overlook any violations of the Academic Honor Principle. Please review the Academic Honor Principle at: <https://student-affairs.dartmouth.edu/policy/academic-honor-principle>. Note that the Faculty of Dartmouth College and the Geisel School of Medicine at Dartmouth are obligated to report potential violations of the Academic Honor Principle.