

**UNIVERSITY OF MASSACHUSETTS  
Department of Public Health  
Program in Biostatistics and Epidemiology**

**PubHlth 540 - Introductory Biostatistics  
Fall 2008**

<http://www-unix.oit.umass.edu/~biep540w>

**Instructor:**

Carol Bigelow, PhD  
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402 Arnold House  
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Amherst, MA 01003  
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**Text:**

Rosner, B. Fundamentals of Biostatistics, Sixth Edition, 2006  
Duxbury Press.  
ISBN 0-534-418201 (Hardcover)

**Statistical Software:**

None is required and none is needed for completion of the examinations.

*It is strongly recommended that you do NOT purchase any statistical software during the first few weeks of the course.* Later, if you like, you might consider using a free-ware application (such as StatGraphics) or a rental of Minitab or SAS (if it is available at your work place) or STATA (if it is available at your workplace).

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**Course Description**

This course is the first in a two semester sequence (PubHlth 540 and PubHlth 640) of introductory biostatistics. The focus in this first course is statistical literacy. The course begins with a review of the concepts of natural variation. From this perspective, the course is an introduction to biostatistical tools for assessing the distinction between systematic and random variability. Topics include: graphical and numerical description, random sampling and selected probability models (the Bernoulli, binomial, and normal), sampling distributions, confidence interval estimation, and the basics of statistical hypothesis testing. If time permits, there will also be an introduction to simple linear regression and correlation.

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## Course Objectives and Outcome Competencies

Course Objectives: By the end of this course, you should be able to perform, interpret, and communicate the findings of selected simple statistical analyses of biological and health data, including description, confidence interval estimation and hypothesis testing.

### Outcome Competencies:

The specific outcome competencies include, but are not limited to the following:

1. The selection and conduct of appropriate statistical analysis – Upon completion of this course, you will have learned the basics of choosing from among the various statistical methods when you want to summarize data, estimate population parameters, or perform a statistical hypothesis test. Specifically, you will have practice in these techniques in the one and two population settings under the assumption of either a normal or binomial population distribution sampling.
  2. Integrating analysis strategies in biostatistics with principles and issues in epidemiology – You will have an understanding of the applicability of data description, estimation and hypothesis testing to epidemiology and, specifically, their interpretation with respect to confounding, effect modification, and bias.
  3. Evaluation of basic statistical principles in published public health research – At the end of this course, you will have had practice in reading published examples of biostatistics. You will be encouraged to earn your 10% participation grade by selecting a published article from your own particular area of interest and writing a brief summary of its content.
  4. Appreciating a conceptual framework that integrates techniques and methods in biostatistics – In this course, two conceptual frameworks are utilized. The first is the perspective that the principles and methods of epidemiologic research are an extension of the scientific method (and the goal of causal inference) to observational studies (and the challenges to causal inference that arise there!). The second conceptual framework is the idea that a statistical hypothesis test is a comparison of “signal” to “noise”.
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**Office Hours:**

4:00-5:00 Mondays, in the hospital cafeteria, or, by appointment.

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**This course has 9 units**

1. Summarizing Data
  2. Introduction to Probability
  3. Populations and Samples
  4. The Bernoulli and Binomial Distributions
  5. The Normal Distribution
  6. Estimation
  7. Hypothesis Testing
  8. Chi Square Tests
  9. Regression and Correlation
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**For each unit, the following are provided**

- Lecture Notes
  - Practice Problems with Solutions (grading is Pass/Fail and is based on timely completion)
  - Computer Illustration(s)
  - Additional Resources
    - Readings
    - Other Links of Interest
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**Examination Schedule**

Exam	Posting	Due	Units Covered
1	Mon Oct 13, 2008	Mon Oct 27, 2008	1 – Summarizing Data 2 – Introduction to Probability 3 – Populations and Samples
2	Mon Nov 10, 2008	Mon Nov 24, 2008	4 – The Bernoulli and Binomial Distributions 5 – The Normal Distribution
3	Fri Dec 5, 2008	Fri Dec 19, 2008	6 - Estimation 7 – Hypothesis Testing 8 – Chi Square Tests

*Note - There will be no examination of unit 9 (Regression and Correlation).*

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**Grading Policy:**

Your course grade will be based on completion of the practice problems, course participation and three “take home” open book examinations.

*Note – If you find that you are not able to complete an assignment by the scheduled due date, I encourage you to use the full week for its completion since the forfeited points are calculated per week, not per day.*

		<b>Percent of Course Grade</b>										
1	<b>Submission of practice problems.</b> For each assignment:  <table> <thead> <tr> <th><u>Date submitted</u></th> <th><u>Grade</u></th> </tr> </thead> <tbody> <tr> <td>- Posted due date</td> <td>100</td> </tr> <tr> <td>- 1-7 days late</td> <td>80</td> </tr> <tr> <td>- 8-14 days late</td> <td>60</td> </tr> <tr> <td>- 15+ days late</td> <td>0</td> </tr> </tbody> </table>	<u>Date submitted</u>	<u>Grade</u>	- Posted due date	100	- 1-7 days late	80	- 8-14 days late	60	- 15+ days late	0	15%
<u>Date submitted</u>	<u>Grade</u>											
- Posted due date	100											
- 1-7 days late	80											
- 8-14 days late	60											
- 15+ days late	0											
2	<b>Examination I</b>  <table> <thead> <tr> <th><u>Date submitted</u></th> <th><u>Grade</u></th> </tr> </thead> <tbody> <tr> <td>- <b>Mon Oct 27, 2008</b></td> <td>Points earned</td> </tr> <tr> <td>- 1-7 days late</td> <td>Points - 20</td> </tr> <tr> <td>- 8-14 days late</td> <td>Points - 40</td> </tr> <tr> <td>- 15+ days late</td> <td>0</td> </tr> </tbody> </table>	<u>Date submitted</u>	<u>Grade</u>	- <b>Mon Oct 27, 2008</b>	Points earned	- 1-7 days late	Points - 20	- 8-14 days late	Points - 40	- 15+ days late	0	25%
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- 8-14 days late	Points - 40											
- 15+ days late	0											
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- <b>Fri Dec 19, 2008</b>	Points earned											
- 1-7 days late	Points - 20											
- 8-14 days late	Points - 40											
- 15+ days late	0											
5	<b>Class Participation</b>  Full credit for class participation can be obtained by any <b>one</b> of the following: (1) submission of SAS or STATA or SPSS or R illustration; OR  (2) submission of an article and a 1 page review; OR  (3) 10 corrections to lecture notes, apart from spelling corrections.	10%										

## Make-up and Rescheduling Policies

- I cannot promise to be able to provide all lecture notes and overheads **ahead of schedule**; sorry.
  - If you miss a class, you can obtain the lecture notes from the course website (<http://www-unix.oit.umass.edu/~biep540w>)
  - *Note to Worcester section:* As a policy, unless there are extenuating circumstances, Linda Hollis will **not** mail out lecture notes and overheads.
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## Letter Grade Determination:

A	95 and over
A-	90 - 94
B+	87 - 89
B	83 - 86
B-	80 - 82
C+	77 - 79
C	70 - 76
F	Below 70

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## Important Dates to Remember

- First Class:
    - On-line Section: Week of Monday September 1-5, 2008
    - UMass/Worcester Section: Monday September 7, 2008
  - Last Day to Drop with no record – Monday September 15, 2008
  - Holiday, Columbus Day – Monday October 13, 2008
  - Monday Class will be held on Tuesday – Tuesday October 14, 2008
  - Last Day to Drop with “DR” – Tuesday October 14, 2008
  - Last Class
    - On-line Section: Week of Monday December 8-12, 2008
    - UMass/Worcester Section: Monday December 8, 2008
  - Take Home Final Exam Due – Friday December 19, 2008
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## Schedule of Lectures and Examinations

Week	Date	Unit - Lecture	Examination
1	Sep 1-5, 2008	Welcome Course Introduction	
2	Sep 8-12, 2008	1 – Summarizing Data	
3	Sep 15-19, 2008	1 – Summarizing Data	
4	Sep 22-26, 2008	2 – Introduction to Probability	
5	Sep 29-Oct 3, 2008	2 – Introduction to Probability	
6	Oct 6-10, 2008	3 – Populations and Samples	
7	Oct 13-17, 2008	4 – Bernoulli and Binomial Distributions	<b>Mon Oct 13 – EXAM I posted</b>
8	Oct 20-24, 2008	5 – Normal Distribution	↓
9	Oct 27 - 31, 2008	5 – Normal Distribution	<b>Mon Oct 27 – EXAM I due</b>
10	Nov 3-7, 2008	6 – Estimation	
11	Nov 10-14, 2008	6 – Estimation	<b>Mon Nov 10 – EXAM II posted</b>
12	Nov 17-21, 2008	7 – Hypothesis Testing	↓
13	Nov 24-28, 2008	7 – Hypothesis Testing	<b>Mon Nov 24 – EXAM II due</b>
14	Dec 1-5, 2008	8- Chi Square Tests	<b>Fri Dec 5 – EXAM III posted</b>
15	Dec 8-12, 2008	9 – Regression and Correlation	↓
-	Dec 15-19, 2009	Course Closeout	<b>Fri Dec 19 – EXAM III due</b>

### ADA Accommodation Policy

Any student who, because of a disability, may require special arrangements in order to meet course requirements should contact me as soon as possible to make necessary arrangements.

Carol Bigelow, PhD  
 tel: 413/545-1319  
 fax: 413/545-1645  
 email: [cbigelow@schoolph.umass.edu](mailto:cbigelow@schoolph.umass.edu)

### Policy on Academic Dishonesty

All students are expected to adhere to guidelines of University of Massachusetts regarding academic honesty. A copy of these guidelines is available online at

[www.umass.edu/dean\\_students/code\\_conduct/acad\\_honest.htm](http://www.umass.edu/dean_students/code_conduct/acad_honest.htm)

The University of Massachusetts/Amherst Senate Document 89-026 defines academic dishonesty as including but not limited to:

- Cheating – intentional deceit, trickery, or breach of confidence, used to gain some unfair or dishonest advantage in one’s academic work.
- Fabrication – intentional falsification or invention of any information or citation in any academic exercise.
- Facilitating dishonesty – knowingly helping or attempting to help someone else commit an act of academic dishonesty.
- Plagiarism – knowingly representing the words or ideas of another as one’s own work in any academic exercise.
- Submitting in whole or in part, without citation, prewritten term papers of another or the research of another (including but not limited to such materials sold or distributed commercially).