

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

**PubHlth 540 - Introductory Biostatistics
Fall 2009**

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

Instructor:

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Teaching Assistant:

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Required Text:

Kirkwood BR and Sterne JAC
Essential Medical Statistics, *Second Edition*
Blackwell Science Ltd.
2003
ISBN 978-0-86542-871-3 (Soft cover)

Other Text Resources (NOT required)

(1) *For those of you dreading this course*

Triola MM and Triola MF
Biostatistics for the Biological and Health Sciences
Pearson Addison Wesley
2006
ISBN 0-321-19436-5

(2) *A wonderful introductory book that emphasizes understanding and literacy and with minimal use of equations and mathematical notation*

Motulsky H
Intuitive Biostatistics
Oxford University Press
1995
ISBN 0-19-508607-4 (Soft cover)

(3) *Last Year's Text – Some liked it. Some didn't. The orientation is clinical*

Rosner B
Fundamentals of Biostatistics, *Sixth Edition*
Duxbury
2006
ISBN 0-534-41820-1

(4) *Spring 2009 Amherst Section Text – Again, some liked it and some didn't. Excellent choice for Minitab users*

Daniel WW
Biostatistics – A Foundation for Analysis in the Health Sciences, *Eighth Edition*
Wiley
2005
ISBN 0-471-45654-3

Statistical Software:

Illustrations in the use of SAS, Stata and R will be provided for those who are interested in any of these programs. Use of these is not required, however. ***Please do NOT purchase any statistical software during the first few weeks of the course.***

Course Description

This course is the first of a two semester sequence of biostatistics: PubHlth 540 – *Introductory Biostatistics* and PubHlth 640 – *Intermediate Biostatistics*. Minimal mathematical background (algebra) is required and logarithms and exponents will be reviewed, if necessary. The goal of PubHlth 540 is basic statistical literacy. It begins with a discussion of the ideas of variability in nature and the tools we use for its description. The distinctions between systematic versus chance variability are detailed. Concepts in simple random sampling and sampling distributions are introduced. Within this framework, you will learn selected methods of data summarization, estimation, and hypothesis testing.

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.

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 5% participation grade by selecting a published article from your own particular area of interest and writing a brief summary of its meaning.
 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.

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 12, 2009	Mon Oct 26, 2009	1 – Summarizing Data 2 – Introduction to Probability 3 – Populations and Samples
2	Mon Nov 9, 2009	Mon Nov 23, 2009	4 – The Bernoulli and Binomial Distributions 5 – The Normal Distribution
3	Fri Dec 4, 2009	Fri Dec 18, 2009	6 - Estimation 7 – Hypothesis Testing 8 – Chi Square Tests

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

Grading Policy:

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

	Percent of Course Grade
Practice Problems	20%
Examination I	25%
Examination II	25%
Examination III	25%
Course Participation	5%

Policy on Late Submissions of Practice Problems and Examinations

	Credit Policy
On Time	Full Credit for points Scored
1-7 Days Late	Points Scored – 20 points
8-14 Days Late	Points Scored – 40 points
15+ Days Late	0 points (no credit)

Note – If you know you are late, I encourage you to use the FULL week, since lost points are per week not per day.

How to Earn Course Participation Credit

- (1) Submission of a SAS or STATA or R illustration; OR
- (2) submission of an article plus a 1 page review; or
- (3) 10 (or more) corrections to the lecture notes, apart from spelling corrections

Posting Scheduling Policies

- **Sorry** – In general, course materials will not be posted ahead of schedule.
- **Note to Worcester Class Section** – Attendance in class is not mandatory. If you miss a class, it is your responsibility to keep up with the class by checking the course website.
- **Note to Worcester section:** In general, Linda Hollis will **not** mail out lecture notes and overheads.

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

Important Dates to Remember

First Class:	Online Section	Monday September 7-11, 2009
	UMass/Worcester Section	Monday September 14-18, 2009
Last Day to Drop with no Record		Monday September 21, 2009
Holiday, Columbus Day		Monday October 12, 2009
Monday Class will be held on Tuesday		Tuesday October 13, 2009
Last Day to Drop with "DR"		Monday October 19, 2009
Last Class:	Online Section	Monday December 7-11, 2009
	UMass/Worcester Section	Monday December 7, 2009
Take Home Final Exam Due		Friday December 18, 2009
Class Participation Due		Friday December 18, 2009

Schedule of Lectures and Examinations

Week	Date	Unit - Lecture	Examination
	Aug 31- Sep 4, 2009	Welcome Course Introduction	
1	Sep 7-11, 2009	1 – Summarizing Data	
2	Sep 14-18, 2009	1 – Summarizing Data	
3	Sep 21-25, 2009	2 – Introduction to Probability	
4	Sep 28-Oct 2, 2009	2 – Introduction to Probability	
5	Oct 5-9, 2009	3 – Populations and Samples	
6	Oct 12-16, 2009	4 – Bernoulli and Binomial Distributions	Mon Oct 12 – EXAM I posted
7	Oct 19-23, 2009	5 – Normal Distribution	↓
8	Oct 26-30, 2009	5 – Normal Distribution	Mon Oct 26 – EXAM I due
9	Nov 2-6, 2009	6 – Estimation	
10	Nov 9-13, 2009	6 – Estimation	Mon Nov 9 – EXAM II posted
11	Nov 16-20, 2009	7 – Hypothesis Testing	↓
12	Nov 23-27, 2009	7 – Hypothesis Testing	Mon Nov 23 – EXAM II due
13	Nov 30 –Dec 4, 2009	8- Chi Square Tests	Fri Dec 4 – EXAM III posted
14	Dec 7-11, 2009	9 – Regression and Correlation	↓
-	Dec 14-18, 2009	Course Closeout	Fri Dec 18 – EXAM III due

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.

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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

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

- a) Cheating – intentional deceit, trickery, or breach of confidence, used to gain some unfair or dishonest advantage in one’s academic work.
- b) Fabrication – intentional falsification or invention of any information or citation in any academic exercise.
- c) Facilitating dishonesty – knowingly helping or attempting to help someone else commit an act of academic dishonesty.
- d) Plagiarism – knowingly representing the words or ideas of another as one’s own work in any academic exercise.
- e) 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).