### EPIB 651: Biostatistics II
#### Spring 2010

| Instructor: | Tongtong Wu, Ph.D  
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ttwu@umd.edu |
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<tbody>
<tr>
<td>Office</td>
<td>Wednesday 4:00-6:45pm</td>
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<tr>
<td>Phone:</td>
<td>Wednesday 3:00-4:00pm and by appointment</td>
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<td>Email:</td>
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<td>Classroom/Time:</td>
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<td>Office Hours:</td>
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ISBN: 0534418201 |
|---|---|
| Supplementary Reading | Raymond H. Myers (1990) *Classical and Modern Regression with Applications*  
ISBN: 0534380166 |
| Required Software | SAS\(^1\) (preferred) or R (free) |
| Course Description | This course provides an introduction to important statistical methods used in public health research, including hypothesis testing, ANOVA, simple and multiple regression, and an introduction to categorical data analysis. |
| Course Objectives | By the conclusion of this course, students will be able to:  
1. Describe statistical assumptions, theory, and methods and select appropriate analytic methods relevant to study designs used in public health research.  
2. Describe inferential statistical theory and methods, and identify and conduct analyses that are used to test for inference.  
3. Describe multivariate statistical theory and methods, and identify and conduct appropriate multivariate modeling given specific types of data and study designs.  
4. Analyze different types of data using standard statistical software, e.g. SAS and R.  
5. Interpret statistical finding in oral and written forms. |
| Prerequisite | EPIB 650 Biostatistics I |

| Grading Procedures | 15%  Homework: Three homework assignments will be given. It is important to complete the homework in a timely manner. Twenty percent will be deducted if the homework is handed in within one week after the deadline; no homework will |

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\(^1\) SAS is available in most computer labs. Students can also purchase from [http://www.oit.umd.edu/slic/products/sas](http://www.oit.umd.edu/slic/products/sas) with $50 for a license and $30 for CD-ROM set (7 CDs).
be accepted after one week or solutions have been posted. Students are encouraged to work together in teams to help each other in understanding the course material and completing the homework problems. However, students must finish their homework independently after group discussion.

30% Mid-term exam: All topics covered before the mid-term examination will be tested. This is a closed-book exam, but a formula sheet of size A4 is allowed.

25% Group project: Two or three students can form a group. Each group should choose a real data set and analyze it with the tools learned from this class. The project is graded based on

10%: Choice of data, analytic methods, appropriateness for hypotheses, correct programming code
10%: Interpretation of results
5%: Class presentation

Each team member will receive the same grade.

30% Final exam: This is a comprehensive exam. All topics covered in the course will be tested. This is a closed-book exam, but a formula sheet of size A4 is allowed.

Course Website
Lecture notes, handouts, SAS examples, homework assignments, and homework solutions will be distributed on the ELMS (Enterprise Learning Management System). Lecture notes will be posted before classes. You can access the website by following the directions:

• Direct your URL to https://elms.umd.edu/
• Enter your Directory ID and Password.
• Click “Course Sites” on the ELMS home tab.
• Click “201001_EPIB651_ttwu: EPIB651 Sec - 0101 Spring 2010:Biostatistics II”.

Course Policies
In the event that the University is closed for an emergency or extended period of time, the instructor will communicate to students regarding schedule adjustments, including rescheduling of examinations and assignments due to inclement weather and campus emergencies. Official closures and delays are announced on the campus website (http://www.umd.edu) and snow phone line (301-405-SNOW), as well as local radio and TV stations.

Accommodations for Students with Disabilities:
If you have a documented disability and wish to discuss academic accommodations for test taking or other needs, please talk to me as soon as possible. You will need documentation from Disability Support Service (301-314-7682.) If you intend to take any or all exams at DSS, it is your responsibility to notify me as soon as possible.

Academic Integrity:
The University's code of academic integrity is designed to ensure that the principle of academic honesty is upheld. Any of the following acts, when committed by a student, shall constitute academic dishonesty:

- **CHEATING**: intentionally using or attempting to use unauthorized materials, information, or study aids in an academic exercise.
- **FABRICATION**: intentional and unauthorized falsification or invention of any information or citation in an academic exercise.
- **FACILITATING ACADEMIC DISHONESTY**: intentionally or knowingly helping or attempting to help another to violate any provision of this code.
- **PLAGIARISM**: intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise.

For more information see: [http://www.inform.umd.edu/CampusInfo/Departments/PRES/policies/iii100a.html](http://www.inform.umd.edu/CampusInfo/Departments/PRES/policies/iii100a.html)

**Religious Observances:**

The University System of Maryland policy provides that students *should not be penalized because of observances of their religious beliefs*; students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the student’s responsibility to inform the instructor in advance of any intended absences for religious observance.

**Course Evaluation**

Your participation in the evaluation of courses through CourseEvalUM is a responsibility you hold as a student member of our academic community. Your feedback is confidential and important to the improvement of teaching and learning at the University as well as to the tenure and promotion process. CourseEvalUM will be open for you to complete your evaluations for spring semester courses between Tuesday, April 27 and Wednesday, May 12. You can go directly to the website ([www.courseevalum.umd.edu](http://www.courseevalum.umd.edu)) to complete your evaluations starting May 12. By completing all of your evaluations each semester, you will have the privilege of accessing the summary reports for thousands of courses online at Testudo.
<table>
<thead>
<tr>
<th>Class Number</th>
<th>Date</th>
<th>Topic</th>
<th>Reading / Assignment</th>
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<tbody>
<tr>
<td>1</td>
<td>01/27/2010</td>
<td>Introduction to course, class expectations Hypothesis testing: one-sample test for mean of normal distributions (null and alternative hypotheses, type I and II error, power, one-/two-sided test, critical value, ( p )-value, sample-size calculation), one-sample test for variance (chi-square test), one-sample test for binomial distributions (large-sample, small-sample), one-sample test for Poisson distributions (large-sample, small-sample)</td>
<td>Chapters 7</td>
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<td>2</td>
<td>02/03/2010</td>
<td>Hypothesis testing: two-sample inference (paired ( t ) test, independent samples with equal/unequal variances, ( F ) test for variance equality, outliers, sample-size calculation and power)</td>
<td>Chapter 8</td>
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<tr>
<td>3</td>
<td>02/10/2010</td>
<td>Nonparametric methods (sign test, Wilcoxon signed-rank test, Wilcoxon rank-sum test)</td>
<td>Chapter 9</td>
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<td>4</td>
<td>02/17/2010</td>
<td>Hypothesis testing: categorical data (two-sample test for Binomial proportions, contingency table, Fisher’s exact test, McNemar’s test for matched-pair data, sample size calculation and power, chi-square test for R×C contingency table, goodness-of-fit test, kappa statistics)</td>
<td>Chapter 10 Homework assignment #1 due</td>
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<td>5</td>
<td>02/24/2010</td>
<td>Multisample inference ANOVA (one-way ANOVA with fixed effects, ( t ) test for comparison of pairs of groups, linear contrasts, multiple comparisons, ANCOVA)</td>
<td>Chapter 12</td>
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<tr>
<td>6</td>
<td>03/03/2010</td>
<td>Discussion of homework #1, 2 Multisample inference ANOVA (two-</td>
<td>Homework assignment #2 due</td>
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7 | 03/10/2010 | **Mid-term exam**  
way ANOVA with fixed effects)  

8 | 03/24/2010 | **Discussion of mid-term exam**  
Multisample inference ANOVA (one-way ANOVA with random effects, intraclass correlation coefficient)  
Chapter 12  

9 | 03/31/2010 | Simple regression (dependent and independent variables, least-squares method, maximum likelihood estimation, sums of squares, correlation coefficient)  
Chapter 11, Myers (1990)  

10 | 04/07/2010 | Multiple regression (least squares procedure, properties of least squares estimators, hypothesis testing, prediction, multicollinearity, goodness-of-fit test)  
Chapter 11, Myers (1990)  

11 | 04/14/2010 | Multiple regression (partial and multiple correlation, model selection, analysis of residuals, influence diagnostics)  
**Paper discussion**  
Chapter 11, Myers (1990)  

12 | 04/21/2010 | Logistic regression (generalized linear model, interpretation of regression parameters, odds ratio, hypothesis testing, prediction, goodness-of-fit test)  
Section 13.7  
**Homework assignment #3 due**  

13 | 04/28/2010 | **Class presentation of final project**  

14 | 05/05/2010 | **Final exam**  
**Project report due**