

**Department of Epidemiology & Biostatistics  
College of Public Health  
University of Georgia**

**EPID 8200  
Molecular Epidemiology  
Spring 2008**

**Course Information**

Instructor: Mark A. Jensen, Ph.D.  
Office Location: Life Sciences B408B  
Phone: 706/542-7796  
Email: maj@uga.edu  
Office Hours: by appointment

**Course Meeting Time and Location**

Building:  
Room:  
Day:  
Time:

**Textbooks and Other Required Course Material**

Readings will be assigned from the text, as well as book chapters and primary sources that will be made available on WebCT. The following books will be used extensively:

Text: *Molecular Epidemiology of Infectious Diseases : Principles and Practices*, Lee W. Riley, 2004, ASM Press.

Text: *Human Genome Epidemiology*, Muin J. Khoury, Julian Little, & Wylie Burke, eds. 2004, Oxford University Press.

Supplementary Text: *Microbial Forensics*, Roger G. Breeze, Bruce Budowle, & Steven E. Schutzer, eds., 2005, Elsevier.

**Course Description**

Introduction to the basic concepts and technologies from genetics and molecular biology, and the diverse ways they are marshaled to solve practical problems in disease spread and risk identification.

*Prereq:* EPID 7010 or permission of instructor

## **Course Learning Objectives**

This course will deliver the working knowledge of basic genetics, molecular biology, and techniques of bioinformatics necessary for critical assessment of molecular epidemiological studies. It will provide suitable preparation for more advanced and specialized study and introductory laboratory training.

The student will develop familiarity with the ways molecular techniques are used to determine epidemic causes and origins, assess the incidence and prevalence of infectious diseases and strains of disease organisms with particular disease characteristics (e.g., drug resistance), determine and survey for predisposing genetic risk factors in chronic diseases, track the dynamics and spread of established and emerging diseases, and trace disease transmission in limited outbreaks and criminal cases.

The student will also have considered in depth the influence large scale molecular epidemiological studies can have on health policy, and the ethical dilemmas surrounding molecular surveillance and genetic disease testing.

## **Course Requirements for Grading Purposes**

Class participation in discussion, especially on the primary literature discussions, is expected throughout the course.

Four take-home quizzes (problem sets) equally spaced throughout the semester.

Brief (200 words) abstract of research paper due in Week 6.

Midterm exam

Research paper (2500-3000 words) due in Week 14.

Final exam

## Topical Outline

Week	Application	Topics	Case studies
1	Introduction	Genetic variation and epidemiology, nucleic acids as markers	
2-5	Bacterial Diseases	Sequence-free markers, clustering and similarity, marker choice, validation, quality control, virulence genes, drug resistance	Enteropathogenic E. coli, methicillin-resistant S. aureus, virulent C. difficile, antibiotic resistance in S. pneumoniae
6-8	Viral Diseases	Sequencing, molecular evolution, phylogenetics, sequence databases, geographic clustering	Zoonotic diseases (rabies, West Nile virus), emerging infectious disease, origin of HIV
9-10	Microbial Forensics	Biocrimes and bioterror, molecular evidence, transmission/attribution, limitations of mol epi	2001 anthrax attacks, Florida dentist case (HIV), pediatric HIV in Libya
11-13	Human Genetic Epidemiology	Human disease genetics, population genetics, linkage and association studies, study design and quality, population risk vs. predictive medicine	Breast cancer genetics, CVD biomarker limitations
14-15	Policy and Ethics	Molecular surveillance and treatment policies, ethical dangers of genetic databases	Antiretrovirals for Africa, polio eradication, deCODE Genetics

## Grading Policy

Evaluation components are weighted as follows:

Midterm Exam	20%
Final Exam	20%
Research paper topic abstract (<200 words)	5%
Research Paper (2500-3500 words)	25%
4 Problem Sets (5% each)	20%
Class participation	10%

Papers are graded according to rubric that accompanies this syllabus.

## Make-Up Policy

Students are expected to complete exams during the class period for which they are scheduled. Only under extraordinary circumstances (prostrating accident or illness, or grave family emergencies, corroborated by a physician) will students be allowed to make up exams. In this event, the date and time for the make-up will be determined by the instructor.

### **Attendance Policy**

Graduate students are professionals who make their own choices. If students choose not to attend class, however, they will fall behind extremely quickly in this course, and their exam grades may suffer considerably. If students are not present, they cannot participate, and so poor attendance can be reflected in the participation component of their grade. Each unnotified absence decreases the participation grade by 2 percentage points.

### **University Honor Code and Academic Honesty Policy**

Students will be expected and encouraged to work together on group projects, and to discuss and critique one another's writing. Plagiarism from any source or cheating in any form will not be tolerated, however, and any instance will be addressed without exception as outlined by the UGA Office of the VP of Instruction (found at <http://www.uga.edu/honesty/ahpd/sect08.htm>).

*All academic work must meet the standards contained in “A Culture of Honesty.” All students are responsible to inform themselves about those standards before performing any academic work.*

### **Students with Disabilities**

Students with disabilities who require reasonable accommodations in order to participate in course activities or meet course requirements should contact the instructor or designate during regular office hours or by appointment.

### **General Disclaimers**

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

Appendix: Research paper grading rubric for EPID 8200 (Molecular Epidemiology)

<b>Factor</b>	<b>C quality paper (1-2pt each)</b>	<b>B quality paper (3-4pt each)</b>	<b>A quality paper (5-6pt each)</b>
<b>Thesis or Hypothesis</b>	Thesis unclear or absent.	Thesis is clearly stated early in paper. Scientific importance of the thesis is made clear	Thesis is clearly stated early in paper. Scientific importance of the thesis is made clear. Thesis presents a strong and original point of view.
<b>Logical Structure and Flow</b>	Relationship between evidence and thesis tenuous or not well explained. Arguments presented do not always clearly support the thesis or address counterarguments to the thesis. Arguments made may indicate incomplete or superficial understanding of material.	Arguments are germane to the thesis. Writing makes the relationship between argument/evidence and the thesis clear. Arguments support the thesis, and address counter-arguments to the thesis. Counterarguments against the thesis are handled honestly and directly.	Arguments flow from evidence to thesis, and are original and insightful in the logical connections made. Counterarguments against the thesis are presented, are handled honestly and rebutted creatively.
<b>Evidence</b>	Too little evidence, or too much irrelevant information presented. Evidence drawn from only one or two sources.	Evidence in support of thesis is presented. Evidence is obtained from several independent experimental, epidemiological or theoretical studies.	Evidence in support of thesis from several independent studies is presented, and is succinctly combined with insight in support of thesis. Evidence against thesis is honestly presented, with rebuttals.
<b>Inclusion of molecular epidemiology</b>	Passing or tangential reference to molecular techniques.	Molecular techniques and their contribution to an epidemiological problem are clearly explained.	Molecular techniques are clearly explained. Molecular techniques are shown to provide crucial data, not obtainable in other ways, that are required for the solution or potential solution of an epidemiological problem.
<b>Spelling, grammar and readability</b>	Many spelling or grammatical errors. Errors and poor flow make it difficult to understand the points made in the paper. High "filler"/"fact" ratio.	Few spelling and/or grammatical errors, that do not detract from the readability or message of the paper. Few irrelevant or superfluous details.	No spelling or grammar errors. Strong, readable, and succinct prose, directly relevant to the main point of the paper.
<b>References and attribution</b>	Many statements of fact unreferenced. Too few references (<15). Reference format inconsistent, bibliography entries not complete.	Few statements of fact are unreferenced. Enough references (15+). Consistent referencing, bibliography complete.	All required attributions made. Enough references (15+). Bibliography complete.