

East Tennessee State University
Department Of Biostatistics and Epidemiology
EPID 3080:
Principles of Epidemiology

Class Location: Displaced from Room 136 Lamb Hall
Instructor: Mike McKamey, MPH, MEd, Clinical Instructor
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Office Hours: Not Applicable.

COURSE DESCRIPTION

This course is an introduction to epidemiology and the application of epidemiologic principles to the investigation, control, and prevention of disease.

COURSE TEXTBOOK

Required textbook: Merrill RM, Timmreck TC. *Introduction To Epidemiology*, 4th or 5th Edition. 2006. Jones and Bartlett. ISBN: 0-7637-3582-5 (4th Edition)

In this course, depending on the integrity of the exam taking process, you may be required to arrange such testing at a certified testing site or through ProctorU, an online proctoring service. Both options, and other similar options, will have fees associated with them that will be the responsibility of the student to pay.

COURSE PURPOSE AND GOALS

The primary aim of the course is to provide a working knowledge of the fundamentals of epidemiology as well as to serve as a foundation for more advanced study of epidemiologic methods.

At the completion of this course, the student should understand and be able to apply the epidemiology methodological topics for analytic observational epidemiology that are described in the professional competencies and learning outcomes below.

PROFESSIONALISM, COMMUNICATION, AND TECHNOLOGY

	Professionalism	Communication	Technology
Principles of Epidemiology EPID 3080	Experiments – Students appropriately administer simple experiments upon a human sample Questionnaires – Students conduct administration of questionnaires to a simulated professional audience	Questionnaires – (Written) Students construct and critique surveys requiring absolute clarity for the reader and then (oral) administer same Presentation – Students present on topics of 1)ethics and 2)publications in public health research	Data Sets – Access and analysis of contemporary data sets from serial surveys Analysis - Excel and online software applied for quantitative and qualitative tests of significance

COMPETENCIES AND LEARNING OBJECTIVES

This course addresses the following **BSHS Core Concentration** and **BSPH Core Concentration** competencies. The competencies are lettered, and the associated course-specific learning objectives are numbered.

Primary Competencies

- A. Recognize the basic terminology and definitions of epidemiology.
 1. Define common epidemiologic terms referencing the source and spread of infectious disease, as well as the development of chronic disease states.
 2. Define interrelationships of the epidemiology triangle.
 3. Differentiate between study designs.
 4. Understand the meaning of bias and confounding.
 5. Compare and contrast surveys and experiments.

- B. Recognize basic epidemiology measures.
 1. Understand odds ratios and relative risks.
 2. Calculate and interpret various incidence rates.
 3. Recognize the role of rate calculation as an indicator of population health.
 4. Identify proper tables and figures used to convey public health findings.
 5. Understand sensitivity and specificity as quality measures for screening exams.
 6. Differentiate between descriptive and analytical surveys.

- C. Recognize how behavior alters human biology.
 1. Recognize the causation of chronic disease.
 2. Understand associations between behavioral exposure and disease outcome.

- D. Describe a public health problem in terms of magnitude, person, time and place.
 1. Relate demographic information to susceptibility to disease.
 2. Identify temporal trends and fluctuations of disease incidence and prevalence.
 3. Contrast expected fluctuations with epidemics and pandemics

- E. Recognize the role of evidence-based principles and scientific knowledge in critical evaluation and decision-making in public health.

1. Understand the difference between association and causation
 2. Understand the premise of statistical significance.
 3. Recognize the need for adjusting data sets for confounders such as age.
 4. Understand the steps of proper epidemiologic investigation.
- F. Embrace a definition of public health that captures the characteristics of the field (social justice, prevention, population- focused, community-oriented) and how these contribute to professional practice.
1. Recognize the roll of epidemiology in defining the health status of a population
 2. Recognize ethical considerations in experimentation and evaluation.
- G. Recognize the contribution of social, behavioral, environmental, and biological factors to specific individual and community health outcomes.
1. Recognize the impact of social and economic factors in health.
 2. Understand the birth cohort effect.
- H. Read with comprehension public health evaluation reports with a focus on their quality, utility, and impact on public health.
1. Understand the analytical findings of peer-reviewed articles as related to significance.

Secondary Competencies

- I. Recognize the impact of global trends and interdependencies on health related problems and systems.
1. Identify historic impacts of communicable disease.
- J. Recognize how the contexts of gender, race, poverty, history, migration, and culture are important in the design of interventions within public health systems.
1. Interpret the population makeup of various disparate countries.
- K. Use information technology to access and interpret public health data.
1. Recognize key sources of public health data.
- L. Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents.
1. Understand how herd immunity relates to vaccination for communicable disease.
 2. Examine historic and contemporary examples of exposure/outcome associations.
- M. Recognize individual, organizational and community concerns, assets, resources and deficits for social and behavioral science interventions.
1. Evaluate prevention strategies.

In addition, **B.S. Environmental Health** students will be able to:

- Be able to apply epidemiological methods to understanding the role of environmental exposures on public health.

- Be able to use epidemiological methods to address environmental health research questions.

The course outline is provided on the following pages, and includes key topics, assessment types and times, as well as correlative professional competencies and learning outcomes for each topic.

Topic	Chapters Competencies and Learning Objectives ¹	Learning Activities, Resources ² , and Assessment	Key Topics
1	Chapter 1: <i>Foundations of Epidemiology</i> Competencies and Objectives: A1, A2, M1	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Online Quiz 	<ul style="list-style-type: none"> • Basic terminology • Role of epidemiology • Epidemiology Triangle • Modes of transmission • Levels of prevention
2	Chapter 2: <i>Historic Developments in Epidemiology</i> Competencies and Objectives covered: C2, D1, E4, I1, L2	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Historical figures puzzle • Online Quiz 	<ul style="list-style-type: none"> • Historical figures • Patterns of spread • Role of disinfection • Importance of incidence recording
3	Chapter 3: <i>Practical Disease Concepts in Epidemiology</i> Competencies and Objectives covered: A1, C1, F1, L1	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Online Quiz 	<ul style="list-style-type: none"> • Natural history of disease • Classification of disease • Temporal advance of disease • Immunization • Control and prevention • Chronic disease
4	Chapter 4A: <i>Design Strategies and Statistical Methods in Descriptive Epidemiology</i> Competencies and Objectives covered: A1, A3, A5, B2, B3, B6, E3, G1, H1, K1	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Research article analyses • Practice problems • Online Quiz 	<ul style="list-style-type: none"> • Ecologic studies • Case reports/series • Cross-sectional surveys • Ratios, proportions, and rates • Direct age-adjustment
5	Chapter 4B: <i>Design Strategies and Statistical Methods in Descriptive Epidemiology</i> Competencies and Objectives covered: A1, B4, E3, K1	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Practice problems • Online Quiz 	<ul style="list-style-type: none"> • Indirect age-adjustment • Display of data • Location and variation • Regression
6	Chapter 5: <i>Descriptive Epidemiology According to Person, Place, and Time</i> Competencies and Objectives covered: C1, C2, D1, D2, D3, F1, G1, G2, J1, K1, L2	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • BRFSS, etc. overview • Online Quiz 	<ul style="list-style-type: none"> • Age, race, family structure, income, etc. • Population pyramids • Geographic considerations • Trends, fluctuations, and cyclic patterns • Birth cohorts •

7	Examination I: Covers Chapters 1 through 5 Competencies and Objectives covered: Cumulative	<ul style="list-style-type: none"> • Chapter PowerPoint • Summary Notes Written Examination	<ul style="list-style-type: none"> • All topics covered in Chapters 1 through 5
8	Chapter 6: <i>General Health and Population Indicators</i> Competencies and Objectives covered: A1, B2, B3, F1	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Online Quiz 	<ul style="list-style-type: none"> • Terminology for recorded data • Rate calculations • Rates as health indicators • Productivity implications
9	Chapter 7: <i>Design Strategies and Statistical Methods in Analytical Epidemiology</i> Competencies and Objectives covered: A1, A3, A5, B1, B6, E1, E2, F1, L2	<ul style="list-style-type: none"> • Read assigned materials • Chapter PowerPoint • Summary Notes • Practice problems • Online Quiz 	<ul style="list-style-type: none"> • Sample selection • Case-control studies • Cohort studies • Odds ratio • Relative risk
10	Chapter 7: <i>Design Strategies and Statistical Methods in Analytical Epidemiology</i> Competencies and Objectives covered: A1, A4, C1, C2, D1, E1, G1,	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Case studies analysis • Online Quiz 	<ul style="list-style-type: none"> • Bias • Confounding • Effect modification • Effects of employment, marriage, etc.
11	Chapter 8: <i>Experimental Studies in Epidemiology</i> Competencies and Objectives covered: A1, A3, A4, A5, B6, C2, E4, F1, F2, I1	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Online Quiz 	<ul style="list-style-type: none"> • Randomization • Blinding • Specialized study designs • Ethical concerns
12	Chapter 9: <i>Statistical and Causal Associations</i> Competencies and Objectives covered: A1, A4, B1, B3, B5, C2, E1, E2, E4, F1, H1	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Practice problems • Online Quiz 	<ul style="list-style-type: none"> • Causal associations • Hypothesis development • Hypothesis testing • Type I and II error • Computation of chi-square • Establishing causation • Sensitivity and specificity
13	Chapter 10: <i>Field Epidemiology</i> Competencies and Objectives covered: A1, A5, B3, B6, C2, D1, D2, D3, E2, E4, F1, M1	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Field Epi Exercise • Online Quiz 	<ul style="list-style-type: none"> • Steps involved for a typical field investigation • Case definition • Data collection • Data analysis • Implementation
14	Examination II: Covers Chapters 6 through 10 Competencies and Objectives covered: Cumulative	<ul style="list-style-type: none"> • Lecture and discussion • Read assigned materials • Chapter PowerPoint • Summary Notes • Written Examination • Research Articles Critique 	<ul style="list-style-type: none"> • All topics covered in Chapters 6 through 10

15	Data Sets and Analysis Competencies and Objectives covered: B2, B4, B6, D2, F1, K1	<ul style="list-style-type: none"> • Utilization of Existing Data Bases • Powerpoint Creation on Database Sources • Lecture and discussion • Read assigned materials • Database Exercise 	<ul style="list-style-type: none"> • BRFSS, YRBS, NHANES, etc.
16	Confounding Competencies and Objectives covered: A4, B2, C2, E3	<ul style="list-style-type: none"> • Adjustment of descriptive data • Interpretation of adjusted data 	<ul style="list-style-type: none"> • Confounding • Stratification of data
17	Qualitative Analysis Competencies and Objectives covered: A1, A3, A5, B1, B3, B6, C1, C2, D1, E1, E2, E4, F1, G1, H1, K1	<ul style="list-style-type: none"> • Identify actual data sets • Selection of study variables • Removal of missing data • Significance testing • Expression of conclusion 	<ul style="list-style-type: none"> • Chi-square • Significance • Data Analysis • Data cleaning • Qualitative
18	Experimentation with Excel Analysis Competencies and Objectives covered: A3, A5, B6, E2, H1	<ul style="list-style-type: none"> • Instruction Creation • Experiment Conduction • Excel Analysis • Lecture and discussion • Read assigned materials • Excel Analysis 	<ul style="list-style-type: none"> • Hypothesis Testing and Quantitative Analysis
19	Ethics Competencies and Objectives covered: F2, G1, L2	<ul style="list-style-type: none"> • PowerPoint Creation and Presentation • Lecture and discussion • Read assigned materials • Presentation 	<ul style="list-style-type: none"> • Historical Events on ethics
20	Critical Review Competencies and Objectives covered: A3, A4, A5, B1, B3, B4, B6, E1, E2, E3, F2, H1,	<ul style="list-style-type: none"> • Literature Review • Research Critique • Lecture and discussion • Read assigned materials • Research Critique 	<ul style="list-style-type: none"> • Acquisition and Interpretation of Peer-reviewed Research
21	Comprehensive Final Competencies and Outcomes covered: Cumulative To be conducted during finals week	Standardized examination covering all basic concepts in accordance with undergraduate policy	All topics will be addressed, but likely in lesser detail than in the correlative Examination I or II

OTHER COURSE MATERIALS

Summary Notes: Chapters will be summarized, with key points emphasized, by a collection of chapter notes to be completed by the student. Although these are not collected or graded, they are constructed by the same person (me) that makes the exam questions (again, me), so their value should be evident.

Chapter PowerPoint: Topics will be complimented using PowerPoint slides that will be posted on the D2L site. These, along with the assigned reading and exercises, are used to learn the material.

Articles and other support materials may be assigned.

MAJOR ASSIGNMENTS, LEARNING ACTIVITIES, and RELATED MATERIALS

Generally, one text chapter will constitute a “topic”, and will have an associated quiz. Chapters 4 and 7 will constitute two topics each and thus require two quizzes each.

Exams: Three exams will be scheduled through the semester. These exams will have a **deduction of 30%** for any late exams.

Review Questions (“Quizzes”): Review questions will accompany each chapter. Although presented as an online assessment, use of the text is anticipated. The review questions are intended to emphasize and (hopefully) necessitate the reading of text chapters. These quizzes will have a limited availability window. Missing this window (which will be specified) will result in a zero for that assignment. Two attempts are allowed, with the AVERAGE of the two grades recorded, so don’t take either attempt too lightly!

Exercises: Confounding exercises, field epidemiology investigations, research critiques, and comprehensive case study analyses will be made. You will be notified concerning the timing of these assignments. Late submissions of exercises will result in a **deduction of 30%**.

GRADING AND GRADING SCALE

Grading: Grades are based on the following:

Examination 1	20%
Examination 2	20%
Comp(etency) Final	20%
Review Questions	15%
Exercises	25%

A final letter grade is assigned according to the Department of Public Health guidelines:

A	95-100%	B-	83-85%	D+	71-73%
A-	92-94%	C+	80-82%	D	68-70%
B+	89-91%	C	77-79%	F	0-67%
B	86-88%	C-	74-76%		

Learning the material: It is important to keep up with assignments, reading, studying the topic material, and completing the exercises. If the student has trouble understanding something, contact the instructor by phone or email to get help. It is not acceptable to wait until the last day to seek help. The instructor may not be available.

Public Health students will be allowed to progress in the Public Health major as long as all Public Health core and concentration courses are completed with a grade of C or better.

Progression status will be evaluated at the close of each semester. Public Health majors (COBH concentration only) receiving a grade below a C- in any core or concentration course will be placed on probationary status in the College of Public Health. If those students wish to repeat the course and progress in the program, they must file an appeal with the Public Health Undergraduate Coordinator.

Public Health majors (COBH concentration only) with probationary status who receives a second grade below a C in any core or concentration course will not be permitted to progress in the Public Health major.

ATTENDANCE POLICY / MISSED CLASS ASSIGNMENTS

It is expected that a student will attend classes regularly. Regardless of reason, the student is expected to take responsibility for learning information presented or referenced on the day(s) of absence.

If a student misses a quiz/examination or encounter due to an EXCUSED absence (defined below) and informs the instructor prior to the absence the quiz/examination or encounter may be completed at the discretion of the faculty. If, however, a quiz/examination or encounter is missed due to an UNEXCUSED absence, a grade of zero will be recorded for classes with missed quizzes/examinations or encounters.

Excused absences

- In the case of emergency (e.g. death in the family or illness), absence from the class may be excused. In such cases it is the responsibility of the student to explain the situation to the faculty member as soon as possible. The faculty member may request verification of the emergency situation or illness from the student.
- Students confined at home or in a hospital for an extended period of time shall notify the faculty member from whose class they will be absent so that arrangements can be made for completion of assignments, if feasible.
- Documented participation in university sanctioned events

During inclement weather the university does not follow guidelines comparable to public school closures. The official university policy is delineated below.

COVID note – As of Fall 2020 previous leniencies may not be in effect. COVID circumstances need to be pervasive as detailed and documented to the instructor and administration.

The new syllabus policy is for students to access information on help services, disability allowances, diversity, mask usage, academic integrity, rights and freedoms, permits/overrides, attendance, Title IX, technical resources, important dates, prerequisites, discrimination/harassment, and academic integrity through the link provided below.

<https://www.etsu.edu/curriculum-innovation/syllabusattachment.php>

Current mask usage policy as of August, 2021

Please wear a mask or other appropriate Face Covering to class. Wearing a mask that covers your nose and mouth communicates the care and respect you have for yourself, the care and respect you have for those you live with, and the care and respect you have for other members of this classroom community. The best evidence we have, from public health professionals, is that wearing masks is one of the best ways to protect against the spread of COVID-19 and other airborne illnesses. Students with medical conditions that inhibit their ability to wear masks should register through disability services by contact Disability Services by telephone at 423-439-8346 or by email at littleme@etsu.edu to request an accommodation. The policy can be found at <https://www.etsu.edu/policies/health-safety/face-coverings.php>.

HAVE A GREAT SEMESTER!