

# Essential Field Epidemiology: Outbreak Investigations

*UC Berkeley Center for Infectious Disease Preparedness  
Public Health N257, Summer 2008  
CCN XXXXX & XXXXX (Lab), 3 units  
July 28 – August 08, 2007*

## Schedule At-A-Glance

Day	Date	Lecture and discussion (XXX_location)	Computer laboratory (XXX_location)
		9:00am-12:00pm	1:00pm-4:00pm
Mon	07/28	Concepts for controlling infectious diseases	Introduction to epidemiologic computing
Tue	07/29	Epidemiological approach: Steps to action	Basic epidemiological computing
Wed	07/30	Outbreak investigation in 7 steps (less)	Basic epidemiological graphing
Thu	07/31	Step 1: Case investigation	Descriptive epidemiology 1
Fri	08/01	Step 2 & 3: Cause investigation & control measures	Descriptive epidemiology 2
Mon	08/04	Step 3: Conduct analytic study #1	Analytic epidemiology: 2x2 tables
Tue	08/05	Step 4: Conduct analytic study #2	Analytic epidemiology: Stratification methods
Wed	08/06	Step 5: Inference in epidemiology	Analytic epidemiology: Regression methods
Thu	08/07	Step 6 & 7: Public health surveillance & Communication	Advanced epidemiological graphing
Fri	08/08	Written Exam	Review exam

## Instructors

Tomás Aragón, MD, DrPH  
Director & Medical Epidemiologist  
Center for Infectious Disease Preparedness  
UC Berkeley School of Public Health  
Tel: 510-643-4935; Mobile: 510-847-9139  
Email: aragon@berkeley.edu

Wayne Enanoria, PhD, MPH  
Public Health Epidemiologist  
Center for Infectious Disease Preparedness  
UC Berkeley School of Public Health  
Tel: 510-643-4934  
Email: enanoria@berkeley.edu

## Course description

This 2-week intensive course will cover the essential knowledge, skills, and abilities necessary to conduct an epidemiologic field investigation, including: essential concepts for the prevention and control of microbial threats; the epidemiologic approach and steps to public health action; steps to conducting an outbreak investigation, conducting a cause investigation; conducting a case investigation; conducting an analytics study; field survey design and implementation; operational aspects of conducting a field investigation; and analysis of outbreak modules using a computer laboratory. The computer lab component will emphasize basic analysis and interpretation. Students will be introduced to R, an open source program for statistical computing and graphics.

Students will be attending 3 hours of lecture in the mornings, and 3 hours of computer laboratory in the

afternoons. Students will be expected to complete 2 to 3 hours of required reading and preparation in the evenings. The total workload is about 45 hours per week.

## Target audience

This course is intended for public health graduate students and professionals who want to learn how to lead or participate in an epidemiologic field investigation, and who want to learn to analyze and interpret epidemiologic data. This includes public health practitioners and trainees, including Cal-EIS officers, Preventive Medicine Residents, health officers, deputy or assistant health officers, communicable disease investigators, environmental health specialists, epidemiologists, health educators, health officers, laboratorians, medical epidemiologists, and public health nurses.

## Course prerequisites

1. Basic familiarity with computers and an interest in conducting epidemiologic data analyses using computer software; and
2. Basic mathematic skills, including ability to utilize fractions, ratios, and percentages;
3. Introductory epidemiology and biostatistics is recommended, but not required.

## Course objectives

Upon completion of this course, participants will be able to:

1. Describe the core epidemiologic concepts for the prevention and control of microbial threats, including the design and evaluation of prevention control measures.
2. Describe the epidemiologic approach to public health action, including surveillance, descriptive and analytic epidemiology, measures of occurrence and association, study design, threats to validity, epidemiologic and causal inference, and types of evidence-based interventions.
3. Describe the seven conceptual steps to conducting an outbreak investigation.
4. Conduct basic epidemiologic analyses, including both data and graphical analyses, using freely available numerical tools.
5. Describe the operational aspects of conducting field investigations, including principles of the incident command system (ICS) applied to an epidemiologic investigations;

## Readings:

1. Materials are provided in your Course Binders.
2. Additional handouts will be distributed in class (store in your Course Binder)
3. Optional readings are available at  
<<http://www.idready.org/elib/epix.html>> (password protected)

## Assignments and evaluation

1. Students are expected to attend and actively participate in the following:
  - a) Daily lectures and computer labs
  - b) ICS-based functional exercise/exam (last day)
2. Computer-based, computational exercises will be completed during computer lab.
3. Students are expected to read and understand preparation materials.

## Grading and Units

This is a 2-unit course, and grading will be based on homework (25%), computer laboratory exercises (25%), and written exam (50%).

## Computer laboratory

Lectures and computer lab will take place at ##LOCATION TBD##. Students should bring the Course Binder and floppy computer disk (or USB memory drive) to each class.

The goals of the computer laboratory are to:

- Reinforce concepts learned in lecture;
- Reinforce your epidemiologic intuition through numerical examples;
- Practice constructing basic graphical display of epidemiologic data;
- Practice conducting basic contingency table analyses for testing investigative hypotheses;
- Practice conducting stratified and regression analyses for testing investigative hypotheses.
- Practice designing and implementing basic survey instruments
- Practice collecting and enter primary data for analysis

## Computers and Software

We will be using the Dell Windows Computers in ##LOCATION TBD##. We will be using freely available software for the analytic component of the course.

1. **R** is a freely available (open source) program for statistical computing and graphics. It is maintained and tested by statistical programmers around the world. We will be using R as a calculator and spreadsheet, and for epidemiologic analysis and graphics (See Appendix A).
2. **Epitools** is an R package developed and maintained by Tomás Aragón for basic epidemiologic analysis in R.
3. **Notepad** is the default Windows text editor. We will be using Notepad to write our commands and save our work.

# Appendix A. R for epidemiologic computing

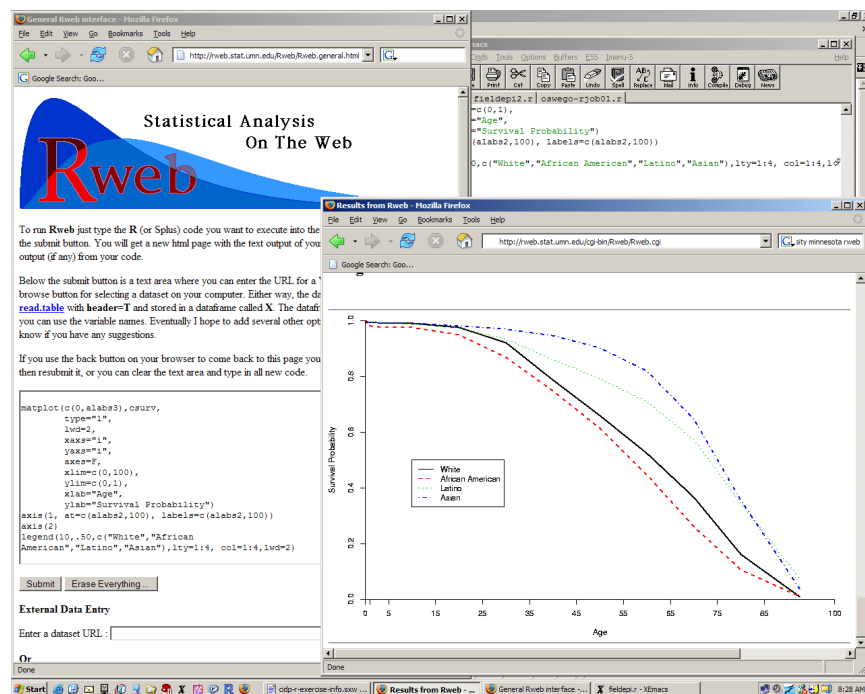
## Where do I get R?

- R project home page at <http://www.r-project.org>
- Download from UC Berkeley at <http://cran.cnr.berkeley.edu/>
- R manuals available at <http://cran.r-project.org/manuals.html>
- R tutorials available at <http://cran.r-project.org/other-docs.html>

## How can I get help with R?

- Visit <http://www.epitools.net> (site developed and maintained by Tomás Aragón)
- Join the EpiTools Yahoo Group at <http://www.epitools.net>
- Join an R mailing list at <http://www.r-project.org/mail.html>

## How can I access R on-the-road?



- From any Internet-connected computer you can access Rweb via the Montana State University website at <http://www.math.montana.edu/Rweb/>

## Other resources

The EpiTools website (<http://www.epitools.net>) maintains links to key sites that list resources for epidemiologic computing.

EpiData is available from <http://www.epidata.dk>

