

New Course Request

Check Appropriate Boxes: Undergraduate credit Graduate credit Professional credit 81

1. School/Division Optometry 2. Academic Subject Code Opt
 3. Course Number 774 (must be cleared with University Enrollment Services) 4. Instructor Richard Meetz
 5. Course Title Introduction to Optometric Research
 Recommended Abbreviation (Optional) Epidemiology and
(Limited to 52 Characters including spaces)
 6. First time this course is to be offered (Semester/Year): FALL '08
 7. Credit Hours: Fixed at 2 or Variable from _____ to _____
 8. Is this course to be graded S-F (only)? Yes ___ No
 9. Is variable title approval being requested? Yes ___ No ___
 10. Course description (not to exceed 50 words) for Bulletin publication: Introduction to epidemiology and biostatistics, principles of epidemiological inquiry & research design, AND the application of statistical methods to clinical data.

11. Lecture Contact Hours: Fixed at _____ or Variable from _____ to _____
 12. Non-Lecture Contact Hours: Fixed at _____ or Variable from _____ to _____
 13. Estimated enrollment: 80 of which 100 percent are expected to be graduate students.
 14. Frequency of scheduling: FALL Will this course be required for majors? yes
 15. Justification for new course: Curriculum revision
 16. Are the necessary reading materials currently available in the appropriate library? yes
 17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.
 18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.
 19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by: [Signature] Date 12/3/07 Approved by: [Signature] Date 12/3/07
 Department Chairman/Division Director Dean
 _____ Date _____ Chancellor/Vice-President
 Dean of Graduate School (when required) University Enrollment Services
 _____ Date _____

V774
Introduction to Epidemiology and Optometric Research
COURSE DESCRIPTION AND TOPICAL OUTLINE
Fall 2008
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W. Swanson, PhD

COURSE DESCRIPTION

Introduction to Epidemiology and Optometric Research is designed as a two credit hour course that focuses on your third year project and the principles and concepts of epidemiology and biostatistics. The goal for this class is to enable the clinical optometrist with an approach for critically reviewing the ophthalmic and health literature. The course is subdivided into three sections: 1) epidemiology 2) biostatistics and 3) research process and special project.

Section 1 -- Epidemiology -- focuses on one of the basic sciences of public health. The educational objectives of the section are to: 1) develop an appreciation of epidemiology and its application to clinical science; 2) review the historical development of epidemiological investigation; 3) develop a familiarity with epidemiological terminology and its utilization; 4) facilitate the introduction to and understanding of the principles and concepts of modern epidemiological investigation; 5) foster the development of skills necessary to improve critical thinking and analytical ability; 6) provide a methodology for the design, implementation and reporting of clinical studies; and 7) provide an approach for critically reviewing the ophthalmic and health literature.

Section 2 -- Biostatistics -- focuses on another of the basic sciences of public health. It is designed to complement the section on epidemiology by discussing the unique application of statistics and statistical principles to the design, implementation and analysis of clinical research. Biostatistics relies on the principles of basic statistics, but applies them in a manner that specifically addresses the issues of disease and wellness in populations and population sub-groups. The educational objectives of this section are to: 1) reinforce the skills required for the preparation, design and development of clinical studies; 2) reinforce the skills required for the proper analysis of clinical data; and 3) develop an understanding and appreciation for the limits of clinical data.

Section 3 -- Research --Special Projects is to give a student hands-on experience in applying the insights learned in the classroom, laboratories, and clinics to a project on a topic of his or her choosing--either in the form of an original project or a significant role in an ongoing study. As stipulated in the course description, the project is to result in a paper, which would be suitable for publication in a scientific journal. This course is intended to give the student experience in (1) assuming responsibility for a formal inquiry, study, or project, and (2) developing skill in scientific writing.

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EXAMINATION AND PROJECT

There will be a final exam on sections 1 and 2. Announced and/or unannounced quizzes may be given at any time during a scheduled class. Students will be assigned a grade of "IP" upon passing the final exam. The research project is due on the last day of class of the spring semester. At that point the IP grade will be removed and a final grade assigned.

EXERCISES

Individual and/or class exercises may be assigned, including but not limited to the following:

- 1) *Literature Critique* -- the class will either be given a paper or will review the ophthalmic literature for a article to read and critique. The critique, or critical review, of the paper will be based on information and material provided during lecture. Students will be expected evaluate the paper in terms of the following criteria: 1) the identification of a research problem, 2) the author's knowledge and use of the literature, 3) the relevance of the research question to identified problem, 4) the hypothesis to be tested, 5) the strategy and methodology for testing the hypothesis, 6) the research population and sample size, 7) the method of data collection and analysis, and 8) the author's analysis of the results and conclusion. The class will discuss the critique as an in-class exercise.
- 2) *Research Design* -- You should select a topic area and find a faculty supervisor who is willing to give you guidance. There is a list of faculty research interests shown in Appendix I (page 9) that should be of help in selecting an area for your project. After discussions with the faculty member you should submit the Form for Research Proposal to the course coordinator. It is important that you keep your faculty supervisor informed of your plans and progress at regular intervals. Your investigation can be any of the following:
 - **An experimental project.** A small, manageable, original laboratory or clinical study and analysis. The project will usually be concerned with a problem or question that you have encountered in your reading or in your laboratory or clinical work. The paper describing your experimental project will normally have the following sections: *Abstract; Introduction; Methods; Results; Discussion; Conclusion; References.*
 - **A case report.** A well-documented report, with at least 10 literature references, on a clinical case you have personally followed. Your paper describing the experimental project will normally include: Introduction; Description of the Clinical Problem; Literature Review; Results (including differential diagnoses); Discussion; and Conclusions or Comments.
 - **A literature critique.** A thorough literature search and critical review--at least 15 double-spaced typewritten pages with 20 or more literature references--on a scientific or clinical topic. The organization of your paper will depend to a great extent on the topic of your review. For example, the *Introduction* might indicate *why* you are doing the review; and in the *Discussion* section, you will want to critique each of the studies and compare their results.
 - **Some other project.** Some other kind of project requires the concurrence of both a faculty supervisor and the V889 course coordinator. You should give the V889 course coordinator a written description of your project so that its potential merit is clear.

Projects for Other Courses

A paper completed as a requirement for a grade in another course or external clinic may not be counted as fulfilling this V889 requirement. *Exception:* a student pursuing a combined OD/MS degree may submit a paper or a thesis which has been part of their MS requirements.

Individual or Joint Effort?

Ordinarily, each project is to be an *individual* student effort. However, in the case of a project which will be too time-consuming for one person alone, *not more than two* students may collaborate on it. Each must take charge of different aspects. The faculty member's judgment on the magnitude of the project will prevail. *Rare exception:* justification may occasionally exist for more than two students to work together on an extraordinarily ambitious project.

Project Supervisor

Your project supervisor should be a faculty member at Indiana University School of Optometry.

The Use of Human or Animal Subjects

If you will use human subjects, you must submit a proposal to the Campus Committee for the Protection of Human Subjects before proceeding. If the procedure will use standard clinical or laboratory techniques, or a simple modification of the same, you can apply for an Expedited Review of your proposal. Obtain the necessary forms and information in Bryan Hall, Room 110, or from <http://www.indiana.edu/~resrisk/hmpg.html>. Allow *at least* 3 or 4 weeks for the review of your application.

If you plan to use animals as subjects, you must strictly adhere to procedures established by the Animal Resource Committee. Again, obtain information in Bryan Hall, Room 110.

GRADES

Final grades will be determined by evaluation of overall performance on the following combined measures: 1) the final examination (approximately 100 points); 2) any announced or unannounced quizzes (approximately 30 points); 3) the assigned exercise (approximately 70 points), and 4) the final project (100 points):

<i>Measures</i>	<i>Approximate Points</i>
Quizzes	30
Exercise	70
Final Examination	100
Final Project	<u>100</u>
Total	300

REFERENCES

- Dart JKG. The use of epidemiological techniques to assess risk: the epidemiology of microbial keratitis. *Eye* 1995; 9:679-683.
- Dawson-Saunders B, Trapp RG. *Basic & clinical biostatistics* Norwalk (CT): Appleton & Lange, 1994.
- Evans J. Randomised controlled trials. *Eye* 1995; 9:684-685.
- Greenberg RS. *Medical epidemiology*. Norwalk (CT): Appleton & Lange, 1993,
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- Mackenbach JP, Looman CWN, van der Meer JBW. Differences in the misreporting of chronic conditions, by level of education: the effect on inequalities in prevalence rates. *Am J Public Health* 1996; 86:706-711.
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- Newcomb, RD, Marshall EC, eds. *Public health and community optometry*, 2nd ed. Stoneham (MA): Butterworths, 1990, (chapters 5-8).
- Oxman AD, Cook DJ, Guyatt GH. Users' guides to the medical literature: VI. how to use an overview. *JAMA* 1994; 272:1367-1371.
- Pearce N. Traditional epidemiology, modern epidemiology, and public health. *Am J Public Health* 1996; 86:678-683.
- Rosenthal AR, Thompson JR. Applications of epidemiological techniques. *Eye* 1995; 9:671-673.
- Susser M, Susser E. Choosing a future for epidemiology: I. eras and paradigms. *Am J Public Health* 1996; 86:668-673.
- Susser M, Susser E. Choosing a future for epidemiology: II. from black box to Chinese boxes and eco-epidemiology. *Am J Public Health* 1996; 86:674-677.
- Wormald R. Assessing the prevalence of eye disease in the community. *Eye* 1995; 9:674-676.
- Zadnik K, Critically reviewing the ophthalmic literature. *Optom Vis Sci* 1994; 71:254-258.

COURSE CONTENT

<i>Section</i>	<i>Content Area</i>
A	<p><i>The research Project</i></p> <ol style="list-style-type: none"> 1. Your project responsibilities; examples of student projects 2. Anatomy of a research paper 3. The Institutional Review Board—Human Subjects 4. Research with Clinical Subjects 5. Data Management 6. Responsible Authorship & Peer review 7. Use of Animals in research 8. Industrial research and the FDA
B	
1.0.0	EPIDEMIOLOGY
1.1.0	History and Science of Epidemiology
1.1.1	Focus of epidemiology
1.1.2	Definition of epidemiology
1.1.3	Ancient Egypt to the 21st century
1.1.4	Classical experiments and milestones
1.1.5	Recent events
1.1.6	Uses of epidemiology
1.1.7	Applications to clinical problems
1.1.8	Critical thinking
1.1.9	Scientific basis of primary care
1.1.10	Epidemiology and health policy
1.2.0	Epidemiological Transition of Disease
1.2.1	Natural history and course of disease
1.2.2	Levels of intervention/prevention
1.3.0	Clinical Data
1.3.1	Measurement
1.3.2	Bias
1.3.3	Comparability
1.3.4	Reliability
1.3.5	Validity
1.3.6	Analysis and inference
1.3.7	Organization/presentation of epidemiologic data
1.4.0	Rates and Ratios
1.4.1	Natality
1.4.2	Morbidity
1.4.3	Mortality
1.4.4	Indices of health
1.5.0	Epidemiology of Blindness and Ocular Conditions

- 1.6.0 **Ethical Topics in Epidemiology**
- 1.6.1 Confidentiality
- 1.6.2 Informed consent
- 1.6.3 Industry-sponsored research

- 1.7.0 **Strategies and Designs of Epidemiological Investigation**
- 1.7.1 Descriptive
- 1.7.2 Observational/analytical
- 1.7.3 Experimental/clinical trials
- 1.7.4 Evaluative -- systems analysis and program evaluation
- 1.7.5 Ecological
- 1.7.6 Measures of effect
- 1.7.7 Advantages/disadvantages

- 1.8.0 **Association and Causal Inference**
- 1.8.1 Definition and types of association
- 1.8.2 Confounding and effect modification
- 1.8.3 Stratification/control tables
- 1.8.4 Criteria for causal inference
- 1.8.5 Causal models

- 1.9.0 **Clinical Research**
- 1.9.1 Selection of research problem
- 1.9.2 Literature critique -- appraisal of existing information
- 1.9.3 Selection of specific research questions
- 1.9.4 Statement of research hypotheses
- 1.9.5 Research plan for testing hypotheses
- 1.9.6 Plans for analysis
- 1.9.7 Plans for collecting data
- 1.9.8 Budgeting
- 1.9.9 Timetable
- 1.9.10 Institutional review boards (IRB) and protection of human subjects
- 1.9.11 Project implementation
- 1.9.12 Reports and publications

- 2.0.0 ***BIOSTATISTICS***

- 2.1.0 **Types of Statistics**
- 2.1.1 Descriptive
- 2.1.2 Inferential

- 2.2.0 **Hypothesis Testing**
- 2.2.1 Error Types
- 2.2.2 Significance levels
- 2.2.3 Power
- 2.2.4 Confidence intervals
- 2.2.5 Sample Size

- 2.3.0 **Bias**

- 2.4.0 **Parameters and Outcome**

- 2.5.0 **Analysis and Interpretation**
- 2.5.1 Computer utilities
- 2.5.2 Reporting
- 2.5.3 Trend analysis

- 2.6.0 **Population Sampling**
- 2.6.1 Types of sampling
- 2.6.2 Sampling procedures for clinical records
- 2.6.3 Sampling size and sampling error

- 2.7.0 **Survival Analysis**
- 2.7.1. Terms
- 2.7.2 Methods
- 2.7.3 Interpretation