BIOS 9331—Meta Analysis

Robert Vogel

Georgia Southern University, Jiann-Ping Hsu College of Public Health, rvogel@georgiasouthern.edu

Follow this and additional works at: https://digitalcommons.georgiasouthern.edu/coph-syllabi

Part of the Public Health Commons

Recommended Citation

https://digitalcommons.georgiasouthern.edu/coph-syllabi/313

This other is brought to you for free and open access by the Public Health, Jiann-Ping Hsu College of at Digital Commons@Georgia Southern. It has been accepted for inclusion in Public Health Syllabi by an authorized administrator of Digital Commons@Georgia Southern. For more information, please contact digitalcommons@georgiasouthern.edu.
### Prerequisites:
A minimum grade of "B" in [BIOS 9131](#).

### Folio Access:
https://my.georgiasouthern.edu/portal/portal.php

### Catalog Description:
This course is designed to address research questions in biomedical and other health-related research using meta-analysis techniques. A survey of past and present challenges of such techniques will be addressed, as will a mixture of Frequentist and Bayesian approaches to meta-analysis. Typical research questions found in health-related issues such as prevention, diagnosis, treatment, and policy will be constructed, followed by the methodologies to analyze such health-related questions. The course will focus on modeling and implementation issues in meta-analysis for biostatistical applications. In particular, this course will emphasize such topics as heterogeneous study results, combining studies with different designs, advantages and disadvantages to using meta-analysis over large trials, meta-analysis for 2x2 tables with multiple treatment groups, meta-analysis of clinical trials,
addressing biases, meta-analysis of patient survival data, among additional biomedical applications.

**Required Textbook:** Anne Whitehead (2002). Meta-Analysis of Controlled Clinical Trials. John Wiley & Sons, INC.

**Required Resources:** (note to whoever reads this, I find this section very confusing as it is asking for one thing a dozen different ways and at the end of the day is nothing but a bunch of pedagogic pedantry distracting from actual work of teaching and assessing performance)

**DrPH Core Student Learning Outcomes:**

To be announced

**CEPH Concentration Competencies:**

To be announced

**CEPH DrPH Competencies**

To be announced

**Performance-Based Objectives Linked to Course Activities (Note: Assessment Activities Described in Next Section)**

At the completion of this course the student will be able to:

1. Understand and use the roles of Meta-analysis.
2. Distinguish between retrospective and prospective meta-analysis. Distinguish between fixed effects and random effect, individual patient data and summary statistics and multicentre trials and meta-analysis.
3. Understand and use protocol development, including background, objective, outcome measures and baseline information, source of data, study selection, data extraction.
4. Understand and use statistical analysis in meta-analysis including, analysis population, missing data at the subject level, analysis of individual trials, meta-analysis models, estimation and hypothesis testing, testing for heterogeneity and exploration of heterogeneity.
5. Understand and use sensitivity analysis.
6. Presenting meta-analysis results.
7. Understand and use methods of estimating the treatment difference in individual trial for binary data, survival data, interval-censored survival data, ordinal data and normally distributed data.
8. Understand and use methods of combining estimates of treatment difference across trials.
9. Understand and use methods of meta-analysis using individual data for fixed effect models and random effect models for binary data, survival data, interval-censored survival data, ordinal data and normally distributed data.
10. Dealing with heterogeneity and with non-standard data sets.
12. Understand and use methods for inclusion of trials with different study.

**Assessment of Student Learning**

Assessments will consist of individual student reports on estimating the treatment difference in an individual clinical trial, combining estimate across trials, performing a meta analysis using individual data, being able to determine heterogeneity across trials and resolving issues created by heterogeneity, presenting and interpreting results of a meta-analysis, resolving issues of publication bias, and resolving conflicts due to different types of studies and non-standard data. These assessments will be performed in the manner of written reports and oral presentations.

(Note to reviewer: this concludes the section on pedagogic pedantry)

**Overview of the Content to be Covered During the Semester:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Readings</th>
<th>Assignment/Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>Chapter 1</td>
<td>TBA</td>
</tr>
<tr>
<td>2</td>
<td>Protocol Development</td>
<td>Chapter 2</td>
<td>TBA</td>
</tr>
<tr>
<td>3-4</td>
<td>Estimating the treatment difference in an individual trial</td>
<td>Chapter 3</td>
<td>TBA</td>
</tr>
<tr>
<td>5-6</td>
<td>Combining estimates of a treatment difference across trials</td>
<td>Chapter 4</td>
<td>TBA</td>
</tr>
<tr>
<td>7-9</td>
<td>Meta-analysis using individual data</td>
<td>Chapter 5</td>
<td>TBA</td>
</tr>
<tr>
<td>10-11</td>
<td>Dealing with heterogeneity</td>
<td>Chapter 6</td>
<td>TBA</td>
</tr>
<tr>
<td>12</td>
<td>Presentation and interpretation of</td>
<td>Chapter 7</td>
<td>TBA</td>
</tr>
</tbody>
</table>
Portfolio Inclusion:

Samples of your work may be reproduced for search purposes and/or inclusion in the professor’s teaching portfolio. You have the right to review anything selected for use, and subsequently ask for its removal.

Instructional Methods:

Class meetings will be a combination of lecture, class discussion, and computer software demonstration. Computer-generated presentations will be used in the lecture portion of this course. Prior to each lecture, the student is encouraged to complete the recommended readings and actively participate in class discussions. In this way, it is hoped that the learner will be better prepared to successfully accomplish the learning objective of each lecture experience.

Grading:

Weighting of assignments for purposes of grading will be as follows:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Exam</td>
<td>150 points (30%)</td>
</tr>
<tr>
<td>Final Exam</td>
<td>200 points (40%)</td>
</tr>
<tr>
<td>Assignments</td>
<td>150 points (30%)</td>
</tr>
</tbody>
</table>

Total Possible Points: 500 points (100%)

The following point scale will be utilized in grading:

- 450-to-500 points (90%) A
- 400-to-449 points (80%) B
- 350-to-399 points (70%) C
300-to-349 points  (60%) D

A cumulative total of 299 points or less will be considered as failing.

There are times when extraordinary circumstances occur (e.g., serious illness, death in the family, etc.). In such circumstances, and/or if you need additional time to satisfactorily complete any course requirement, please consult with the instructor within a reasonable amount of time.

*Nota Bene:* Extensions are not guaranteed and will be granted solely at the discretion of the instructor.

NO EXTRA CREDIT PROJECTS WILL BE ASSIGNED!

**General Expectations**

1. For every one-credit hour, you should expect to work roughly two hours outside the classroom each week. For example, for a three credit hour course, during a regular fifteen week semester, you should expect approximately ninety hours of work outside of class.

2. Students are expected to keep up with the class, to read the required material, and to submit assignments and activities by due dates and times.

3. Students are expected to independently complete all activities, exercises, assignments, and assessments including exams.

4. Students are expected to produce quality work. Typos and grammar errors should be kept to a minimum. The format and readability of submissions will be taken into consideration when assigning a grade.

5. Remember to check when assignments are due. It is recommended that you stay ahead of schedule on the assignments, so if an emergency happens, your assignment will be completed and ready to submit within the designated time frame. It is your responsibility to keep track of the due dates for each assignment.

**Response Times**

During a normal work week (i.e., Monday 9:00 AM through Friday 5:00 PM) students can expect responses as follows:

- Email: within 48 hours
- Discussion posts: within 72 hours
- Assignment grades: within 72 hours of submission date.
Exceptions: I may not check FOLIO or GSU email over the weekends. If you send me an email after 5:00 PM on Friday, please do not expect a response until the following Monday.

All assignments will be graded promptly so that students may accurately calculate their grades at any point in time during the semester. There are times when extraordinary circumstances occur (e.g., serious illness, death in the family, etc.). In such circumstances, and/or if you need additional time to satisfactorily complete any course requirement, please consult with the instructor within a reasonable amount of time. Extensions are not guaranteed and will be granted solely at the discretion of the instructor.

**Course Expectations**

**Texting and Use of Cell Phones (and Other Technologies)**

Please do not text in class or use your cell phone during class! Texting during class (or in a meeting) is disruptive and rude…at least to me. My preference is that you put cell phones away during class meetings so they are not a source of temptation. Offenders will be asked to leave.

**Class Attendance and Participation Policy**

Federal regulations require attendance be verified prior to distribution of financial aid allotments. Regular attendance is expected. Your attendance will be verified at the first regular class session.

It is the policy of the University to permit students, faculty, and staff to observe those holidays set aside by their chosen religious faith. The faculty should be sensitive to the observance of these holidays so that students who choose to observe these holidays are not seriously disadvantaged. It is the responsibility of those who wish to be absent to make arrangements in advance with their instructors.

Students participating in authorized activities as an official representative of the University (i.e., athletic events, delegate to regional or national meetings or conferences, participation in university-sponsored performances, and **JPHCOPH funded**) will not receive academic penalties and, in consultation with the instructor of record, will be given reasonable opportunities to complete assignments and exams or given compensatory assignment(s) if needed. The student must provide written confirmation from a faculty or staff advisor to the course instructor(s) at least 10 days prior to the date for which the student will be absent from the class. The student is responsible for all material presented in class and for all announcements and assignments. When possible, students are expected to complete these assignments before their absences. In the event of a disagreement regarding this policy, an appeal may be made by either the student or the instructor of record to the corresponding college dean. (*University Graduate Catalog*)
**Academic Misconduct**

As a student registered at this University, it is expected that you will adhere to only the strictest standards of conduct. It is recommended that you review the latest edition of the *Student Conduct Code* book, as well as the latest Undergraduate & Graduate Catalog to familiarize yourself with the University’s policies in this regard. Your continued enrollment in this course is an implied contract between you and the instructor on this issue; from this point forward, it is assumed that you will conduct yourself appropriately.

**Plagiarism:**

According to the Academic Dishonesty Policy of Georgia Southern University, Plagiarism includes (but is not limited to):

A. Directly quoting the words of others without using quotation marks or indented format to identify them.
B. Using published or unpublished sources of information without identifying them.
C. Paraphrasing material or ideas without identifying the source.
D. Unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic material.

If you are accused of plagiarism by a JPHCOPH, the following policy, as per the Judicial Affairs website: ([http://students.georgiasouthern.edu/judicial/faculty.htm](http://students.georgiasouthern.edu/judicial/faculty.htm)) will be enforced:

**PROCEDURES FOR ADJUDICATING ACADEMIC DISHONESTY CASES**

**First Offense - In Violation Plea**

1. If the professor and the Dean of Students agree that the evidence is sufficient to warrant a charge of academic dishonesty, the professor should contact the Office of Judicial Affairs to determine if this is a first violation of academic dishonesty. The incident will be reported via the following website: [http://students.georgiasouthern.edu/judicial/faculty.htm](http://students.georgiasouthern.edu/judicial/faculty.htm)
2. If it is a first violation, the professor should talk with the student about the violation. **If the student accepts responsibility in writing and the professor decides to adjudicate the case, the following procedures will be followed:**
   a. The student will be placed on disciplinary probation for a minimum of one semester by the Office of Judicial Affairs.
   b. The student will be subject to any academic sanctions imposed by the professor (from receiving a 0 on the assignment to receiving a failing grade in the class).
   c. A copy of all the material involved in the case (Academic Dishonesty Report Form and the Request for Instructor to Adjudicate Form) and a brief statement from the professor concerning the facts of the case and the course syllabus should be mailed to the Office of Judicial Affairs for inclusion in the student’s discipline record.

**First Offense - Not in Violation Plea (student does not admit the violation)**
If the professor and the Dean of Students agree that the evidence is sufficient to warrant a charge of academic dishonesty, the professor should contact the Office of Judicial Affairs to determine if this is the first or second violation of academic dishonesty. The student will be charged with academic dishonesty and the University Judicial Board or a University Hearing Officer would hear the case. If the student is found responsible, the following penalty will normally be imposed:

a. The student will be placed on Disciplinary Probation for a minimum of one semester by the Office of Judicial Affairs.
b. The student will be subject to any academic sanctions imposed by the professor.

**Second Violation of Academic Dishonesty**
If the professor and the Dean of Students agree that the evidence is sufficient to warrant a charge of academic dishonesty, and if it is determined this is the second violation, the student will be charged with academic dishonesty and the University Judicial Board or a University Hearing Officer would hear the case. **If the student is found responsible, the following penalty will normally be imposed:**

a. Suspension for a minimum of one semester or expulsion.
b. The student will be subject to any academic sanctions imposed by the professor.

**NOT RESPONSIBLE FINDING**
When a student is found not responsible of academic dishonesty, the work in question (assignment, paper, test, etc.) would be forwarded to the Department Chair. It is the responsibility of the Chair to ensure that the work is evaluated by a faculty member other than the individual who brought the charge and, if necessary, submit a final grade to the Registrar. For the protection of the faculty member and the student, the work in question should not be referred back to the faculty member who charged the student with academic dishonesty.

In the case of a Department Chair bringing charges against a student, an administrator at the Dean’s level will ensure that the student’s work is evaluated in an appropriate manner.

**CONFIDENTIALITY**
In accordance with provisions of the Family Educational Rights and Privacy Act of 1974 and the Georgia Open Records Act, any information related to a violation of academic dishonesty or the outcome of a judicial hearing regarding academic dishonesty, is prohibited and must be treated as confidential by members of the faculty.

**Accommodations for Individuals with Disabilities**
In compliance with the Americans with Disabilities Act (ADA), Georgia Southern University will honor requests for reasonable accommodations made by individuals with disabilities. Students must self disclose any disability for which an accommodation is being sought to the Student Disability Resource Center (SDRC) before academic or other accommodations can be implemented. For additional information, please call the Director of EEO and
Title IX at (912) 478-5136 / TDD (912) 478-0273 or the SDRC Director at (912) 478-1566 / TDD (912) 478-0666. The TDD phone numbers are intended for individuals with hearing impairments.

University Calendar for the Semester
The University Calendar is located with the semester schedule, and can be found at: http://em.georgiasouthern.edu/registrar/resources/calendars/

One Final Note
The contents of this syllabus are as complete and accurate as possible. The instructor reserves the right to make any changes necessary to the syllabus and course material to ensure better student learning. The instructor will announce any such changes in class. It is the responsibility of the student to know what changes have been made in order to successfully complete the requirements of the course.

This syllabus, my lecture notes, and all materials distributed and presented during this course are protected by copyright law. You are authorized to take notes in this class but that authorization extends to only making one set of notes for your personal use and no other use. You are not authorized to sell, license, commercially publish, distribute, transmit, display, or record notes from this class unless you have my written consent to do so.
STUDENT CONDUCT CODE
The Student Conduct Code is the official University publication governing student conduct and behavior. It is the responsibility of each student to become familiar with the rules and regulations governing student life. Student conduct procedures, appeal procedures, and disciplinary sanctions are found in the Student Conduct Code at http://students.georgiasouthern.edu/conduct. I acknowledge that I have read and understand this statement referencing the Student Conduct Code.

ACADEMIC DISHONESTY
The University goal is to foster an intellectual atmosphere that produces educated, literate people. Because cheating and plagiarism are at odds with that goal, they shall not be tolerated in any form. Students are expected to adhere to the rules and regulations as set forth in the Student Conduct Code. Therefore, all work submitted by a student must represent that student's own ideas and effort; when the work does not, the student has engaged in academic dishonesty. Plagiarism occurs when a person passes in another person's work as his or her own, borrows directly from another person's work without proper documentation, and resubmits his or her own work that has been previously submitted without explicit approval from the instructor. For example, academic dishonesty occurs whenever a student participates in any of the following: Cheating submitting material that is not yours as part of your course performance; using information or devices that are not allowed by the faculty; obtaining and/or using unauthorized materials; fabricating information, research, and/or results; violating procedures prescribed to protect the integrity of an assignment, test, or other evaluation; collaborating with others on assignments without the faculty's consent; cooperating with and/or helping another student to cheat; demonstrating any other forms of dishonest behavior. Plagiarism directly quoting the words of others without using quotation marks or indented format to identify them; using sources of information (published or unpublished) without identifying them; paraphrasing materials or ideas without identifying the source; self-plagiarism - resubmitting work previously submitted without explicit approval from the instructor; unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic material. NOTICE: The list above is intended only to provide general guidelines for recognizing and avoiding common types of academic dishonesty. It is in no way an exhaustive or comprehensive list of all the types of academic dishonesty. For more information about academic honesty, see the Student Conduct Code at http://students.georgiasouthern.edu/conduct. I acknowledge that I have read and understand the Academic Dishonesty Policy.

I have read the syllabus and understand the contents and course requirements.

__________________________  ______________________  ________________
Student Name (print)         Student Signature       Date