PHA 6806  Pharmacoeconomic Modeling
Summer a 2015
3 Semester Credit Hours

Course Purpose:
This course provides an introduction to methods and techniques for conducting pharmacoeconomic studies. The course covers a wide range of topics, including classifying disease, identifying pharmaceutical products from prescription claims, risk adjustment, practical decision analysis, Markov modeling, and indirect treatment comparisons. The class will involve numerous exercises from building simple decision trees to complex Monte-Carlo Markov models. Exercises will be conducted using Microsoft Excel, although only a rudimentary knowledge of the program is required.

Course Faculty and Office Hours

Course Coordinator:
Michael Dickson, PhD., R.Ph.
Email Office:
Phone:

Co-Presenter

Dan Malone, PhD, RPh
Email: dancmalone@ufl.edu
Phone: 520 481 2025

Office Hours
Presenters and the course coordinator can be reached by email. Virtual office hours are held by appointment only. If you need to speak with an instructor please arrange a meeting via email.

Place and Time of Class Sessions

Sundays: 8:00 p.m. - 10:00 p.m. Tuesdays: 8:30 p.m. – 10:30 p.m. (All times Eastern)

Course Objectives
Upon completion of this course, the student will:
1. Understand ICD-9 and NDC codes for health care products and services;
2. Understand the reasons for risk adjustment and be able to compare diagnosis and pharmacy-based risk adjustment tools;
3. Understand concepts of risk and odds ratios;
4. Know where to find prices for health care services;
5. Understand fundamental concepts of decision analysis and Markov analysis;
6. Be able to construct an cost-effectiveness analysis;
7. Be able to construct a probabilistic decision analysis in Excel;
8. Be able to construct Markov decision analytical models; and
9. Interpret results from the cost-effectiveness analysis

**Pre-Requisite Knowledge and Skills**
Commercial Applications of Pharmacoeconomics

**Course Structure & Outline**

**Course Structure.** This course is designed to provide the student with knowledge and experience to conduct and evaluate health technologies assessments. The course is provided via recorded and live sessions, with recorded sessions usually occurring on Tuesdays and live sessions occurring on Sundays. The schedule may change based on the needs of the students and instructor availability.

Students are expected to:

- attend live sessions and watch assigned video lectures;
- Complete assignments in a timely manner
- Read assigned articles
- Participate in class discussions

Failure to participate fully in all aspects of the course may result in a lower grade for the specific assignment and overall lower course grade.

**Course Outline/Activities.** Refer to an outline of course activities

**Textbooks**
Highly Recommended Textbook:

**Software**
Students are expected to purchase a student version of TreeAge software ($45.00) from [www.treeage.com](http://www.treeage.com). This should occur before the start of the third week of the course.

**Readings**

ISPOR Good Practices Documents


Other Readings:

A guide to understanding common prescription drugs pricing terms. Academy of Managed Care Pharmacy.


**Active Learning Requirements**

Excel and TreeAge exercises

**Student Evaluation & Grading**

**Evaluation Methods**

<table>
<thead>
<tr>
<th>Grading:</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Item</td>
<td>Points</td>
</tr>
<tr>
<td>Indirect treatment comparisons*</td>
<td>5 (Excel)</td>
</tr>
<tr>
<td>Decision model exercises (5)*</td>
<td>25 (5 points for each assignment) (TreeAge)</td>
</tr>
<tr>
<td>Using meta-analysis in modeling</td>
<td>5 (Excel)</td>
</tr>
<tr>
<td>Article evaluation assignments</td>
<td>15 (3 articles for 5 points each)</td>
</tr>
<tr>
<td>Examinations</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>100 points</td>
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</table>

*See below for information pertaining to these assignments

Assignments must be turned in by the date and time due in order to be eligible for full points. Any assignment turned in late will be subject to 1-point penalty for each day late. The exams will have two parts. The first part consists of multiple-choice items over the reading material and concepts discussed during class. This portion of the exam is timed and closed book. The other portion of the exam is an open book exam that will cover the concepts presented in the assignments and discussions. You will have 1 week to complete the open book exam.

Final course grades will be based upon the percentage of total possible points that a student can earn across the entire term. Letter grades will be assigned according to the following manner:

**Article Evaluation Assignments**

Select 3 readings (excluding the textbook) and write a brief (not to exceed 1 page) summary of the article. The summary should include two parts. The first part should address the following elements: a) purpose or goal of the study or method; b) approach taken; c) data used (if any); d) results; and e) conclusions. The second part should be a critique of the paper in terms of the approach, data, results, and conclusion. To receive full credit your summary of the article should not be just a restatement of the paper but an insightful examination of content. You can integrate parts 1 and 2, or have them appear sequentially. Do not write more than 1 page, single spaced,
11 point font, with 1” margins. Deadlines for the article evaluation assignments are:

1) Article review #1 – End of 3rd week of course
2) Article review #2 – End of 5th week of course
3) Article review #3 – End of 6th week of course

Article reviews are worth 5 point each.

**Grading Scale**

- 95-100 = A
- 90-94 = A-
- 86-89 = B+
- 83-85 = B
- 80-82 = B-
- 76-79 = C+
- 73-75 = C
- 70-72 = C-
- 66-69 = D+
- 63-68 = D
- 60-62 = D-
- <60 = E

**Class Attendance Policy**

Attendance in live class sessions is strongly recommended. Students should, whenever possible, anticipate upcoming absences. In the event of absence from live session – it is recommended the student review the recorded session.

**Quiz/Exam Policy**

A take home exam is given at the end of the course – students will have 1 week (7 days) to complete the take home exam. There is a closed book exam that must be taken within 7 days after the last class period.

**Make-up Quiz/Exam Policy**

There is no make up policy for the exams because the exams are given at the end of the course.

**Policy on Old Quizzes and Assignments**

Students are not provided copies of old exams.
Assignment Deadlines
Excel, TreeAge, and article evaluation assignments are penalized 0.5 points for each day late.

General College of Pharmacy Course Policies
The College of Pharmacy has a website that lists course policies that are common to all courses. This website covers the following:

1. University Grading Policies
2. Academic Integrity Policy
3. How to request learning accommodations
4. Faculty and course evaluations
5. Student expectations in class
6. Discussion board policy
7. Email communications
8. Religious holidays
9. Counseling & student health
10. How to access services for student success

Please see the following URL for this information:

Complaints
Should you have any complaints with your experience in this course please visit:

http://www.distancelearning.ufl.edu/student-complaints to submit a complaint.

Other Course Information
[Use Appendices to include other course information such as:
  1. Directions of assignments
  2. Rubrics that will be used to evaluate performance
  3. Additional course policies ]

Excel and TreeAge Assignments
Excel assignments will largely be completed during class. Students unfamiliar with Excel are encouraged to learn basic functions used in spreadsheets, including copy and pasting, entering data, and basic mathematical formulas. Online training for Excel is made available through the University of Florida. See
TreeAge assignments also will be largely completed in class. Basic tutorials will be given to provide students with skills to navigate TreeAge and construct both basic and advanced cost-effectiveness models.

**Appendix B. Schedule of Course Activities/Topics**

<table>
<thead>
<tr>
<th>Week</th>
<th>Instructor</th>
<th>Topic / Recommended Readings /Learning Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1a</td>
<td>Dickson</td>
<td>Risk Adjustment:</td>
</tr>
<tr>
<td>Week 1b</td>
<td>Dickson</td>
<td><strong>International Classification of Disease, Common Procedural Codes, National Drug Codes</strong></td>
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<tr>
<td></td>
<td></td>
<td>Anon. History of International Classification of Diseases.</td>
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<tr>
<td>Week 2a</td>
<td>Dickson</td>
<td><strong>Measures of Risk and Logistic Regression</strong></td>
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<tr>
<td>Week 2b</td>
<td>Malone</td>
<td><strong>Indirect Treatment Comparisons</strong></td>
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<table>
<thead>
<tr>
<th>Week 3a</th>
<th>Dickson</th>
<th><strong>Identifying Costs and Sources for Costs</strong></th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>A guide to understanding common prescription drugs pricing terms. Academy of Managed Care Pharmacy.</td>
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<table>
<thead>
<tr>
<th>Week 3b</th>
<th>Dickson</th>
<th><strong>Decision Models and Cost-Effectiveness Models</strong></th>
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<thead>
<tr>
<th>Week 4a</th>
<th>Dickson</th>
<th><strong>Using Variables in TreeAge; Incorporating Information from</strong></th>
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<tbody>
<tr>
<td>Week</td>
<td>Instructor</td>
<td>Topic</td>
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<td>--------</td>
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<td>--------------------------------------------</td>
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<tr>
<td>5b</td>
<td>Dickson</td>
<td><strong>Discounting and Half-cycle Correction</strong></td>
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</table>
| Week 6b | Dickson | **Cost-Effectiveness Plane and Cost-Effectiveness Acceptability Curves**  
|---|---|---|
| Week 7a | Dickson | **Other Modeling Approaches – An Overview**  
|
| Week 7b | Dickson | **Course Review** |

**Learning Objectives:**

**Week 1:**

- Discuss the concept of risk with respect to health  
- Identify commonly used risk factors  
- Compare and contrast diagnosis based and pharmacy based risk adjustment tools  
- Distinguish between ICD-9 and CPT codes  
- Identify entities responsible for maintaining ICD, CPT, and NDC codes  
- Describe approaches to NDC formats  
- Discuss limitations of using drug names, therapeutic class codes, and brand names for drug product identification  
- Discuss the role of NCPDP standards as it applies to pharmaceutical claims datasets

**Week 2:**

- Understand concept of risk and relative risk  
- Differentiate between relative risk and odds ratio  
- Be able to calculate RR, OR, and relative risk reduction  
- Understand the concept of number needed to treat  
- Describe the purpose of logistic regression  
- Be able to calculate a logged odds ratio
• Understand the concept of indirect treatment comparisons

Week 3:
• Differentiate between cost and charge
• Contrast and compare these common medication cost terms: AWP, WAC, ASP
• List common sources for costs of medical care and services
• Be able to adjust prices for inflation
• Be able to discount future costs
• Construct a decision tree

Week 4:
• Create a decision tree with variables
• Calculate path probabilities for a decision model
• Roll-back a decision tree to find the optimal path
• Identify the steps for Markov modeling
• Convert a rate to a probability
• Be able to contrast and compare Monte Carlo, cohort, and matrix algebra solutions for Markov models
• Create a Markov model
• Debug a decision tree

Week 5:
• Create a dynamic transition probability
• Discuss the notion of the half-cycle correction
• Be able to apply a discount rate in an economic model
• Implement distributions for measures of effectiveness and cost in an economic analysis
• Explain the difference between first and second order uncertainty
• Conduct a Monte Carlo simulation

Week 6:
• Conduct a probabilistic sensitivity analysis
• Conduct a one-way sensitivity analysis
• Explain the concept of a tornado diagram
• Create a tornado diagram
• Discuss the role of thresholds for CEA
• Identify regions of acceptance on a cost-effectiveness plane

Week 7:
• Explain structural uncertainty
• Differentiate between heterogeneity and uncertainty
• Explain the concept of extended dominance
- Contrast and compare cost-effectiveness planes and cost-effectiveness acceptability curves
- Be able to construct a incremental cost-effectiveness ratio scatter plot
- Be able to construct a CEAC graph
- Identify the most cost-effective strategy using a CE plane and CEAC graph at a given willingness to pay