Course Purpose:
This course provides an introduction to methods and techniques for conducting pharmaeconomical 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
Vary

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
Vary

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 Pharmacoconomics

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.
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
Vary

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

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


Drummond M, Sculpher M. Common methodological flaws in economic evaluations. Medical Care 2005; 43(suppl 7);II-5-II-14.


**Active Learning Requirements**
Complete Excel and TreeAge exercises

**Student Evaluation & Grading**

**Evaluation Methods**

<table>
<thead>
<tr>
<th>Grading</th>
<th>Item</th>
<th>Points</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect treatment comparisons*</td>
<td>5</td>
<td>(Excel)</td>
<td></td>
</tr>
<tr>
<td>Decision model exercises (5)*</td>
<td>25</td>
<td>(5 points for each assignment) (TreeAge)</td>
<td></td>
</tr>
<tr>
<td>Combining efficacy data* or Markov model (TBA)</td>
<td>5</td>
<td>(Excel)</td>
<td></td>
</tr>
<tr>
<td>Article evaluation assignments</td>
<td>15</td>
<td>(3 articles for 5 points each)</td>
<td></td>
</tr>
<tr>
<td>Examinations</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Total** | **100**                                   |        | **Note**

*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 final exam 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 grading scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93.0-100</td>
</tr>
<tr>
<td>A-</td>
<td>90.0-92.9</td>
</tr>
<tr>
<td>B</td>
<td>83.3-86.5</td>
</tr>
<tr>
<td>B-</td>
<td>80.0-83.2</td>
</tr>
<tr>
<td>C</td>
<td>73.3-76.5</td>
</tr>
<tr>
<td>C-</td>
<td>70.0-73.2</td>
</tr>
<tr>
<td>D</td>
<td>63.3-66.5</td>
</tr>
<tr>
<td>D-</td>
<td>60.0-63.2</td>
</tr>
</tbody>
</table>

Article Evaluation Assignments
Select three articles from the reading list (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 re-statement 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 inch margins. Deadlines for the article evaluation assignments are:

1) Article review #1 – End of 3rd week of course
2) Article review #2 – End of 4th week of course
3) Article review #3 – End of 5th week of course

Article reviews are worth 5 point each.

Grading Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>B+</td>
<td>86.6-89.9</td>
</tr>
<tr>
<td>C+</td>
<td>76.6-79.9</td>
</tr>
<tr>
<td>D+</td>
<td>66.6-69.9</td>
</tr>
<tr>
<td>B</td>
<td>83.3-86.5</td>
</tr>
<tr>
<td>C</td>
<td>73.3-76.5</td>
</tr>
<tr>
<td>D</td>
<td>63.3-66.5</td>
</tr>
<tr>
<td>A</td>
<td>93.0-100</td>
</tr>
<tr>
<td>A-</td>
<td>90.0-92.9</td>
</tr>
</tbody>
</table>

Class Attendance Policy
Attendance in live class sessions is recommended. Students should, whenever possible, anticipate upcoming absences and speak with the instructor to make prior arrangements for make-up work. Students must contact the instructor as soon as possible following any unanticipated absence.
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 completed 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
Assignments are penalized 1 point 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.

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.
TreeAge assignments will be discussed in class and completed by students as homework. Basic tutorials will be given to provide students with skills to navigate TreeAge and construct both basic and advanced cost-effectiveness models.

### Appendix. Schedule of Course Activities/Topics

<table>
<thead>
<tr>
<th>Dates or Week</th>
<th>Learning Activities/Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week 1a</strong></td>
<td><strong>Risk Adjustment:</strong></td>
</tr>
<tr>
<td><strong>Week 1b</strong></td>
<td><strong>International Classification of Disease, Common Procedural Codes, HCPCS, and National Drug Codes</strong></td>
</tr>
<tr>
<td></td>
<td>$Anon. History of International Classification of Diseases.</td>
</tr>
<tr>
<td><strong>Week 2a</strong></td>
<td><strong>Measures of Risk and Logistic Regression</strong></td>
</tr>
<tr>
<td><strong>Week 2b</strong></td>
<td><strong>Indirect Treatment Comparisons</strong></td>
</tr>
<tr>
<td><strong>Week 3a</strong></td>
<td><strong>Identifying Costs and Sources for Costs</strong></td>
</tr>
<tr>
<td></td>
<td>$A guide to understanding common prescription drugs pricing terms. Academy of Managed Care Pharmacy</td>
</tr>
<tr>
<td>Week</td>
<td>Topic</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| Week 3b | Decision Models and Cost-Effectiveness Models, Introduction of TreeAge software  
| Week 4a | Using Variables in TreeAge; Incorporating Information from Meta-analysis into Decision Models  
| Week 4b | Markov Modeling  
| Week 5a | Probabilistic Models: 1st and 2nd order Uncertainty  
| Week 5b | Discounting and Half-cycle Correction  
| Week 6a | Net Health Benefits, CEA plane and CEA curves, Acceptability curves |
| Week 6b | Cost-Effectiveness Plane and Cost-Effectiveness Acceptability Curves  
| Week 7a | Other Modeling Approaches – An Overview |
| Week 7b | 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:**

• 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
• 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 and be able to interpret the results

**Week 3:**

• Be able to calculate a logged odds ratio
• Understand the concept of indirect treatment comparisons
• 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