

The University of North Carolina at Charlotte
College of Health and Human Services
Health Care Informatics Program (HCIP)
SPRING 2022

Course No./Title: HCIP 6108-090: Intermediate Decision Analysis in Healthcare
Credits: 3 Graduate Credit Hours
Days/Time/Location: Wednesdays, 6:00 PM – 8:45 PM, College of Health & Human Services 109
Faculty: Timothy J. Lowe, PhD (tlowe13@uncc.edu)
Teaching Assistant: TBA
Office Hours: Immediately after class or by appointment only

Course Description:

This course addresses the use of quantitative management tools for medical decision making in populations. Topics addressed include the use of decision trees, Markov models, and Monte Carlo simulation and other forecasting methods to address uncertainty in medical decision-making. Students will work in teams to complete assignments culminating in a real-world decision model addressing a current medical topic. Recent statistics coursework and statistical programming competency are required.

Required Text & Software:

- Cost-Effectiveness Analysis in Health: A Practical Approach (Feb 29, 2016)
Peter Muennig and Mark Bounthavong
http://www.amazon.com/Cost-Effectiveness-Analysis-Health-Practical-Approach/dp/1119011264/ref=sr_1_2?ie=UTF8&qid=1461636005&sr=8-2&keywords=cost+effectiveness
- Rational Will 3.1 – (student license) - Students are required to purchase the software license for the completion of assignments - \$49.00 (note: the software is Windows-based; if you have a Mac you will need to install a Windows emulation program; IMPORTANT – DON'T PURCHASE UNTIL I PROVIDE YOU WITH A SPECIAL CODE TO GET THE STUDENT RATE): <https://www.spicelogic.com/Products/Rational-Will-29>

Optional Text:

- Cost-Effectiveness in Health and Medicine (2nd Edition)
Peter J. Neumann, Gillian D. Sanders, Louise B. Russell, Joanna E. Siegel, and Theodore G. Ganiats
https://www.amazon.com/Cost-Effectiveness-Health-Medicine-Peter-Neumann/dp/0190492937/ref=pd_sbs_14_1?encoding=UTF8&pd_rd_i=0190492937&pd_rd_r=31T4YB725J6FW5PQN345&pd_rd_w=2FgLO&pd_rd_wg=WHgaR&pvc=1&refRID=31T4YB725J6FW5PQN345

Supplementary Material: Provided via UNCC Canvas

- *U.S. Department of Veterans Affairs: Health Services Research & Development – HCEA Cyberseminar Series*
A multi-session course that focuses on cost-effectiveness analysis and budget impact analyses. Special attention is placed on experimental designs, but the methods are generalizable to observational studies. The course includes lectures on micro-costing the intervention, using VA pharmacy data, and decision modeling.
(<https://www.hsrd.research.va.gov/cyberseminars/series.cfm>) (HCEA Series)
- Reports of the ISPOR-SMDM Modeling Good Research Practices Task Force – 1 to 7 (*Society for Medical Decision Making* www.smdm.org)
- *International Society for Pharmacoeconomics & Outcomes Research (ISPOR) - Task Force Index*
(<https://www.ispor.org/taskForces/TFindex.asp>)
- Published articles for enhancing content, methodological critique, and discussion

Course Objectives: After completing the course, students will be able to do the following:

- Apply probability-based techniques to resolve healthcare decision problems
- Identify and use the complex variables needed to successfully conduct decision analysis in healthcare
- Build forecasting models that assist with healthcare decision-making
- Use selected software to generate computer solutions of statistical and other quantitative decision models

- Learn through project and case studies the application of quantitative decision making to find solutions to real life business problems in healthcare settings
- Apply statistical inference and hypothesis testing methods in drawing evidence-based conclusions from data analyses
- Demonstrate skills in communicating the methods, analysis, and results of healthcare decision problems

Instructional Method:

Teaching strategies for each session will typically consist of the Socratic teaching method; the delivery of focused and probing questions that stimulate critical thinking and discussion around key concepts derived from required and supplemental course materials as well as real-world healthcare problems. Students will be expected to attend class prepared and having read the materials. Each class will consist of a discussion of the materials and team-based collaboration and execution of a project. Teams will be expected to collectively present the project approach, rationale, and results throughout the course in written and oral formats (i.e., project deliverables).

Team-Based Participation:

Team-based participation in a project is designed for students to learn how to share ideas, critique ideas, and work in a cooperative framework. It is designed to mimic the matrix environment common in healthcare and healthcare analytics settings. For most, the process is smooth with occasional differences in opinions or difficulty arranging a mutually agreeable solution. There are times, however, when students do not participate in contributing to class efforts. All students are expected to contribute in a *meaningful* way to the course. ***Please note*** you are receiving graduate credit and commensurate levels of maturity and effort are expected. **Peer evaluations will be conducted within each group at the end of the semester to assure fairness in grading.**

Course Requirements:

- **Team-based Project:** Each student will work with a team on a project topic of their choice related to a *healthcare decision (e.g., new vs. old treatment)*. The topic should include a *healthcare intervention (e.g., medication, device, procedure, use of healthcare professionals, etc.)*. One student per group will be selected as the team leader and will be responsible for facilitating communication and participation of team members on project content outside of class. Each team will complete several project deliverables (i.e., study proposal, protocol, statistical analysis plan, report & abstract, and manuscript) throughout the course. Data needs will be assessed and presented during the protocol stage. Students will use Rational Will software in addition to dataset management and statistical analysis software (e.g., R, SAS, STATA, SPSS, Excel, etc.) for completion of the project. Students will be required to present each project deliverable in a professional manner during class using visual aids such as MS PowerPoint.
- **Class Attendance & Participation:** It is expected that students will attend all classes. It is the student's responsibility to make-up for missed classes and complete all assignments. Team-based participation in this project is designed for students to learn from each other in addition to helping students refine communication and business skills. For most, the process is smooth with occasional differences in opinions or difficulty arranging a mutually agreeable solution. There are times, however, when students do not participate in class efforts. All students are expected to contribute in a *meaningful* way to the course. ***Please note*** you are receiving graduate credit and commensurate levels of maturity and effort are expected. **Peer evaluations will be conducted within each group at the end of the semester to assure fairness in grading.**

Evaluation Methods:

Proposal	10%
Protocol	20%
Statistical Analysis Plan	20%
Report & Abstract	20%
Manuscript & PowerPoint	30%

Total	100%

***NOTE** – Written and oral presentation of each deliverable will be due on the same date. **Past due deliverables** will be accepted with a **5% deduction** for each day they are late.

Graduate Grading Scale:

- A = 90-100%
- B = 80 - 89%
- C = 70 - 79%
- U = 69% & below

Tentative Schedule

Week	Lecture Date	Topics / Concepts
1	01/12/2022 Required HW: Muennig & Bounthavong – Chapters 3 & 5 Howard 1966 ISPOR Task Force Report 1: Building Better Models & Good Research Practices in Modeling Studies <i>Optional: If you need to brush up on your stats then read Kroese 2018;</i> <i>Cyber Seminar #1 – Risha Gidwani: An Overview of Decision Analysis (01/19/18)</i>	1. Introductions & Review of Syllabus 2. <i>Lecture: Introduction to Decision Analysis & Review of Basic Probability I</i>
2	1/19/2022 Required HW: Lowe et al. 2013 Amin et al. 2013 Lammers et al. 2003 Lowe – Tips on Proposal Writing <i>Optional: Cyber Seminar #2 – Doug Owens: New Recommendations for the Conduct of Cost-Effectiveness Analysis from the Second Panel on Cost-Effectiveness Analysis in Health & Medicine (01/12/18)</i> <i>The Galton Board mp4 is included in the Additional Materials folder on Canvas</i>	1. Discussion: Muennig & Bounthavong 3 & 5; Howard 1966; ISPOR Task Force: Building Better Models & Good Research Practices in Modeling Studies 2. <i>Lecture: Developing a Research Project & Finding the Data You Need</i> 3. Team Assignments 4. Team Working Session – Proposal Development 5. Team Leader Session
3	01/26/2022 Required HW: Muennig & Bounthavong – Chapter 12 ISPOR Drug Cost Task Force Reports 1 - 6 <i>Optional: Cyber Seminar #3 – Todd Wagner: Estimating the Cost of an Intervention (01/31/18)</i>	1. Discussion: Lowe et al. 2013; Amin et al. 2013; Lammers et al. 2003; Lowe PowerPoint 2. <i>Lecture: Review of Basic Probability II</i> 3. Team Working Session – Proposal & Presentation Development 4. Team Leader Session
4	02/02/2022 Required HW: Muennig & Bounthavong – Chapters 4, 6, 7 & 8 Prieto et al. 2003 <i>Optional: Mauskopt et al 2021 – Economic Evaluation of Vaccine Programs; Cyber Seminar #4 – Josephine Jacobs: Introduction to Effectiveness, Patient Preferences, & Utilities (02/14/18)</i> <i>Neumann, Sanders, Russell et al. – Chapters 2 & 4</i>	Submission Deadline 11:59 pm: Written Proposal & Presentation 1. Discussion: Muennig & Bounthabong 12; ISPOR Drug Cost Task Force Reports 1-6 2. <i>Lecture: Introduction to Cost-Effectiveness and Cost-Utility Analysis</i> 3. Proposal Presentations 4. Team Working Session – Protocol Development 5. Team Leader Session

5	02/09/2022 Required HW: ISPOR Task Force Overview of SMDM Models 1-3 Rosenzweig 2014 <i>Optional: Cyber Seminar #5 –Risha Gidwani: Estimating Transition Probabilities for a Model (02/28/18)</i>	<ol style="list-style-type: none"> 1. Discussion: Muennig & Bounthavong 4, 6, 7, 8 & 12; Prieto et al. 2003 2. <i>Lecture: Introduction to Decision Trees</i> 3. Team Working Session – Protocol Development 4. Team Leader Session
6	02/16/2022 Required HW: ISPOR Task Force Overview of SMDM Models 4-5 Sonnenberg et al. 1993 Komorowski & Raffa 2016 <i>Optional: Chen 2016; Bradley 2017; McKinney et al. 2018</i>	<ol style="list-style-type: none"> 1. Discussion: ISPOR Task Force Overview of SMDM Models 1-3; Rosenzweig 2014 2. <i>Lecture: Medical Markov Models and Monte Carlo Simulation 1</i> 3. Team Working Session – Statistical Analysis Plan 4. Team Leader Session
7	02/23/2022 Required HW: Werner et al. 2013 Ho 1995 Kleinberg 1990 ISPOR Task Force Overview of SMDM Models 6-7 <i>Optional: Cyber Seminar #6 – Jeremy Goldhaber-Fiebert: Medical Decision Making & Decision Analysis (03/07/18) Neumann, Sanders, Russell et al. – Chapters 5 & 6</i>	<p>Submission Deadline 11:59 pm: Written Protocol & Presentation</p> <ol style="list-style-type: none"> 1. Discussion: ISPOR Task Force Overview of SMDM Models 4-5; Sonnenberg et al. 1993; Komorowski & Raffa 2016 2. <i>Lecture: Medical Markov Models and Monte Carlo Simulation 2; Rational Will Demonstration</i> 3. Examples: https://www.spicelogic.com/docs/RationalWill 4. Protocol Presentations 5. Team Working Session – Statistical Analysis Plan 6. Team Leader Session
8	03/02/2022 Required HW: Muennig & Bounthavong – Chapter 9 Rational Will assignment – TBA <i>Optional: Cyber Seminar #7 – Risha Gidwani: Evidence Synthesis to Derive Model Transition Probabilities, Part 1 (03/14/18)</i>	<ol style="list-style-type: none"> 1. Discussion: Werner et al. 2013; Ho 1995; Kleinberg 1990; ISPOR Task Force Overview of SMDM Models 6-7 2. <i>Lecture: Decision Trees vs. Random Forest Analysis</i> 3. Team Working Session – Statistical Analysis Plan 4. Team Leader Session
9	03/09/2022 Required HW: ISPOR Task Force: Quality Improvement in CEA ISPOR Task Force: Transferability of Economic Evaluations; Economic Evaluation of Adverse Events	Spring Break (no class)

10	03/16/2022 Required HW: Gandhi et al. 2015 <i>Optional: Cyber Seminar #8 – Risha Gidwani: Evidence Synthesis to Derive Model Transition Probabilities, Part 2 (03/28/18)</i> <i>Neumann, Sanders, Russell et al. – Chapters 9 & 13</i>	Submission Deadline 11:59 pm: Written SAP 1. Discussion: ISPOR Task Force: Quality Improvement in CEA; Transferability of Economic Evaluations; Economic Evaluation of Adverse Events 2. <i>Lecture: Choosing an Appropriate Statistical Test (1)</i> 3. SAP Presentations 4. Team Working Session – Programming Models 5. Team Leader Session
11	03/23/2022 Required HW: Kleinberg 1996 <i>Optional: Cyber Seminar #9 – Risha Gidwani: Sensitivity Analyses (04/04/18)</i>	Submission Deadline 11:59 pm: PDF of Decision Model 1. Discussion: Gandhi et al. 2015 2. <i>Lecture: Choosing an Appropriate Statistical Test (2)</i> 3. Team Working Session – Programming Models 4. Team Leader Session
12	03/30/2022 Required HW: Citrome et al. 2014 Select Journal & Review Guidelines <i>Optional: Cyber Seminar #10 – Todd Wagner: Budget Impact Analysis (04/11/18)</i>	1. Discussion: Kleinberg 1996 2. <i>Lecture: SAS Tricks: setting up procedures and interpreting output (COVID-19 and Flu data)</i> 3. Team Working Session – Report & Abstract Development 4. Team Leader Session
13	04/06/2022 Required HW: ISPOR Task Force: Applying Dynamic Simulation Modeling Methods in Health Care Delivery Research <i>Optional: Cyber Seminar #11 – Wei Yu: How can Cost-Effectiveness Analysis be made more relevant to US Health Care? (04/25/18)</i>	Submission Deadline 11:59 pm: Report & Abstract 1. Discussion: Citrome et al. 2014; Journal Review Guidelines 2. <i>Lecture: SAS Tricks: Patient matching; Correcting for Statistical Error</i> 3. Team Working Session – Report & Abstract; Manuscript Development 4. Team Leader Session
14	04/13/2022 Required HW: Jensen et al. 2016 ISPOR Task Force Report – CHEERS CHECKLIST <i>Optional: Cyber Seminar #12 –Austin Frakt: Writing for Reach: Communicating Scholarly Results to General Audiences (11/18/19)</i>	Submission Deadline 11:59 pm: First Draft of Manuscript 1. Discussion: ISPOR Task Force: Applying Dynamic Simulation Modeling Methods in Health Care Delivery Research 2. <i>Lecture: R Tricks: Programming Statistical Tests in R</i> 3. Team Working Session – Manuscript Development 4. Team Leader Session
15	04/20/2022 Required HW: Makin & De Xivry 2019	Submission Deadline 11:59 pm: Draft PowerPoint Presentation 1. Discussion: Jensen et al. 2016 2. <i>Lecture: CHEERS Checklist</i> 3. Team Working Session – PowerPoint Presentation 4. Team Leader Session
16	04/27/2022 Required HW: <i>None</i>	1. Discussion: Makin & De Xivry 2019; Manuscript and PowerPoint Feedback & Peer-Review Process 2. Team Working Session – Review Manuscript and PowerPoint Feedback & Revise
17	05/04/2022	Reading Period (No class)

FINAL	05/11/2022	<p>Submission Deadline (in class): Final Manuscript (Word) and Final PowerPoint Presentation</p> <ol style="list-style-type: none"> 1. Final Oral Presentations 2. Class evaluation
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Course Credit Workload:

This 3-credit course requires 3 hours of classroom or direct faculty instruction and 6 hours of out-of-class student work each week for approximately 15 weeks. Out-of-class work may include but is not limited to: REQUIRED READINGS & EDUCATIONAL WEBINARS, LIBRARY RESEARCH, GROUP WORKING SESSIONS & WRITTEN ASSIGNMENTS.

Syllabus Subject to Change:

The standards and requirements set forth in this syllabus may be modified at any time by the course instructor. Notice of such changes will be by announcement in class, written or email notice, or by changes to this syllabus posted on the Canvas site for the course.

UNIVERSITY POLICIES

Code of Student Responsibility:

“The UNC Charlotte Code of Student Responsibility (the Code) sets forth certain rights and responsibilities in matters of student discipline. The Code defines these responsibilities and guarantees you certain rights that ensure your protection from unjust imposition of disciplinary penalties. You should familiarize yourself with the provisions and procedures of the Code” (Introductory statement from the UNC Charlotte brochure about the Code of Student Responsibility). The entire document may be found at this Internet address: <http://legal.uncc.edu/policies/ps-104.html>

Academic Integrity:

All students are required to read and abide by the Code of Student Academic Integrity. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Students are expected to submit their own work, either as individuals or contributors to a group assignment. Definitions and examples of plagiarism and other violations are set forth in the Code. The Code is available from the Dean of Students Office or online at: <http://www.legal.uncc.edu/policies/ps-105.html>

Faculty may ask students to produce identification at examinations and may require students to demonstrate that graded assignments completed outside of class are their own work.

SimCheck:

As a condition of taking this course, papers that the instructor in good faith suspects are in whole or in part plagiarized may be subject to submission for textual similarity review to Turnitin SimCheck for the detection of plagiarism. Such works will be included as source documents in the SimCheck reference database solely for the purpose of detecting plagiarism of such papers. No student papers will be submitted to SimCheck without the student’s written consent and permission. If a student does not provide such written consent and permission, the instructor may: 1. Require a short reflection paper on research methodology; 2. Require a draft bibliography prior to submission of the final paper, or 3. Require the cover page and the first cited page of each reference source to be photocopied and submitted with the final paper.

Title IX Reporting Obligations Regarding Incidents of Sexual Harassment, sexual assault, dating violence, domestic violence, or stalking:

UNC Charlotte is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or experiences any of these incidents, know that you are not alone. UNC Charlotte has staff members trained to support

you in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more.

Please be aware that many UNC Charlotte employees, including all faculty members, are considered [Responsible Employees](#) who are required to relay any information or reports of sexual misconduct they receive to the Title IX Coordinator. **This means that if you tell me about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, I must report the information to the Title IX Coordinator.** Although I must report the situation, you will still have options about how your case will be handled, including whether you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone confidentially, you can contact any of the following on-campus resources, who are not required to report the incident to the Title IX Coordinator: (1) University Counseling Center (counselingcenter.uncc.edu, 7-0311); (2) Student Health Center (studenthealth.uncc.edu, 7-7400); or (3) Center for Wellness Promotion (wellness.uncc.edu, 7-7407). Additional information about your options is also available at titleix.uncc.edu under the "Students" tab.

Disability Accommodations:

UNC Charlotte is committed to access to education. If you have a disability and need academic accommodations, please provide a letter of accommodation from Disability Services early in the semester. For more information on accommodations, contact the Office of Disability Services at [704-687-0040](tel:704-687-0040) or visit their office in Fretwell 230.

Diversity Statement:

UNC Charlotte strives to create an academic climate in which the dignity of all individuals is respected and maintained. Therefore, we celebrate diversity that includes, but is not limited to ability/disability, age, culture, ethnicity, gender, language, race, religion, sexual orientation, and socio-economic status.

All students are required to abide by the UNC Charlotte Sexual Harassment Policy (<http://www.legal.uncc.edu/policies/ps-61.html>) and the policy on Responsible Use of University Computing and Electronic Communication Resources (<http://www.legal.uncc.edu/policies/ps-66.html>). Sexual harassment, as defined in the UNC Charlotte Sexual Harassment Policy, is prohibited, even when carried out through computers or other electronic communications systems, including course-based chat rooms or message boards.

Religious Accommodation:

It is the obligation of students to provide faculty with reasonable notice of the dates of religious observances on which they will be absent by submitting a [Request for Religious Accommodation Form](#) to their instructor prior to the census date for enrollment for a given semester <http://legal.uncc.edu/policies/ps-134.html>. The census date for each semester (typically the tenth day of instruction) can be found in UNC Charlotte's Academic Calendar (<http://registrar.uncc.edu/calendars/calendar.htm>).