

MHSA 8650 – Operations Management Methods in Health Care Fall 2006

When: Tuesdays, 4:30 – 7:15P
Where: Solms Hall 204
Prerequisite(s): PUBH 7200, MHSA 8610
Instructor: Joey Crosby, Ph.D, R.Ph
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Office Hours: Tuesday – 9:00A – 12:00P
Wednesday – 9:00A – 12:00P
Thursday – 9:00A – 12:00P

Course Description

As per the AASU graduate catalogue (2006-2007), the course involves the application of various quantitative methods of analysis to support operations-based decision making within contemporary health services organizations. This course will focus on various areas of operations management in health services organizations – including, but not limited to, staffing, patient flow/scheduling, capacity and resource planning, quality management, productivity management, inventory control, etc. – where operations research/analytical methods such as linear and nonlinear programming, queuing theory, decision modeling, simulation, and regression analysis can be utilized to facilitate informed decision making by the health services manager.

Since they began to evolve in the 1940's, decision support methods known collectively as “operations research” or “management science” or “modeling” for solving business decision problems have increased greatly in popularity and usefulness. Almost all of the Fortune 500 U.S. companies use such approaches in order to make their operations more efficient and profitable. Applications have significantly impacted the business functional areas of operations and logistics, finance, marketing and, of interest to us, health care. As the health services environment continues to evolve towards a more institutionally competitive, highly regulated enterprise, the need for greater efficiency and “profitability” in daily operations will continue to increase in importance.

Course Objectives

Upon successful completion of the requirements and assignments for this course, it is anticipated that each student will be able to demonstrate the following competencies as referenced in the Healthcare Leadership Alliance Health Services Management Competency Model, version 2.0:

- (1) Knowledge of the historical evolution and rationale for the adoption and use of operations management / research methods within health services organizations over time. **(HLA competency 4.10)**
- (2) Knowledge of the sources of data/information, both internal and external to health services organizations, that are available for the purpose of informing the operational decision-making process, and the relative advantages and disadvantages of using each type of data as part of this process **(HLA competencies 5.14, 5.25, 5.E.21)**
- (3) Knowledge of various planning and control functions (e.g., production planning and scheduling, inventory management, project management) associated with the production and distribution processes, which converts scarce resources into goods and services, and delivers them to customers/ patients. **(HLA competencies 5.5, 5.6, 5.29)**
- (4) The ability to select and execute appropriate qualitative and quantitative approaches that are available to solve problems within each function, including (but not limited to) optimization modeling, decision analysis, and/or simulation modeling/forecasting. **(HLA competencies 5.16, 5.32, 5.E.5)**
- (5) The ability to select and execute appropriate qualitative and quantitative approaches to develop solutions to operational problems that reduce costs while maintaining or increasing output, quality, and customer service. **(HLA competencies 5.32, 5.35)**
- (6) Knowledge of other business/operational problem areas (e.g. finance, marketing, project management) for which various operations research/ modeling methods may be appropriate in terms of the identification of potential solutions. **(HLA competency 5.D.3)**
- (7) The ability to utilize commonly available computer software (i.e. Microsoft Excel) to facilitate the appropriate statistical analysis of various sources of data. **(HLA competency 5.E.1)**

Course Textbook

Winston, W. and Albright, C.A. Practical Management Science. 3rd Edition. Duxbury/Thomson Learning. (2006) – available in AASU bookstore with Student Edition of The Decision Tools and Stat Tools Suite.

Course Evaluation and Grading

The grading scale used to evaluate student performance will be the same as that used in other AASU courses: 90-100 (A); 80-90 (B); 70-79 (C); 65-69 (D); <65 (F). Any deviations from this standard grading schedule will be a result of the distribution of class scores on particular assignments as well final grades. Each student's grade in this course will be based on the following (with the relative weights for each):

1.	Course Examination	30%
2.	Problem Assignments	50%
3.	Operations Research Article Summary	20%

Course Examination

Much as in the other graduate classes I teach, the course examination will be of the comprehensive, take-home variety with students allowed 1-2 weeks to complete the exam towards the end of the semester (see course schedule for tentative dates). The format of the examination will be comprehensive, including any/all materials covered in lecture as well as problems assigned throughout the term.

Students are typically allowed to use their class notes, textbook(s), computer software (e.g. MS Excel) and/or any other reference material(s) (e.g. student diskette) deemed appropriate for the purpose of completing the exam, but student collaboration on any part of the examination will be prohibited. As part of the examination process, students will be expected to synthesize a substantial amount of information (quantitative as well as qualitative) into a professionally prepared document in a fairly short period of time. The grading of the course examination is very stringent, and students should strive for completeness, accuracy, clarity, and brevity in their work.

Operations Research Article Summary

During the course of the semester, each student will be required to select one (1) article / study from the scholarly literature that involves the application of a specific operations research method (e.g. linear programming, simulation, decision analysis model, etc.) and to summarize the contents of that article / study utilizing the criteria that are described in the introductory chapter of the textbook:

- (1) What is/are the definition(s) of the operational problem(s) being addressed in the article?
- (2) What source(s) of data are utilized for purposes of assisting in the definition of the problem and/or the modeling phase of the study? What is your overall assessment of the accuracy / integrity of the data that are utilized?
- (3) What method(s) are utilized in the study for the purpose of developing a model – analytic and/or simulation -- of the problem being addressed? Describe any model specifications that are given in the text of the study (e.g. what is being optimized, maximized, or minimized; what are the model constraints that are considered, etc.).
- (4) What step(s) are undertaken by the analyst(s) in the study to assess the suitability of the model in terms of its utility in addressing the problem being studied?
- (5) What are the main recommendations made by the analyst(s) in the study based on the modeling results obtained? How much confidence do you have in those recommendations?
- (6) Describe any implementation and/or evaluation issues that are discussed in the study – i.e. were any of the recommendation(s) adopted/implemented post-modeling, and what were the results of the implementation, if any are given?
- (7) Describe your overall impression of the analytical rigor employed by the analyst(s) conducting the study. Were analytical/modeling limitations described to your satisfaction?

Students are free to select any article or study from the operations research literature that involves a health services organizational setting / problem. What follows are some selected examples from the literature of such articles / studies (students may choose any one article from this list, all are available as full text articles via the GALILEO system):

Operations Research Article Summary (continued)

Bordoloi, S.K. and Weatherby, E.J. "Managerial Implications of Calculating Optimal Nurse Staffing in Medical Units". Health Care Management Review. Vol. 24, No. 4 (1999), pp. 35-44.

Holmes, R.L., Schroeder, R.E., and Harrington, L.F. "Using Microcomputers to Improve Capital Decision Making." Journal of Health Care Finance. Vol. 25, No. 3 (1999), pp. 52-59.

Specht, P.H. "Multicriteria Planning Model for Mental Health Services Delivery." International Journal of Operations and Production Management. Vol. 13, No. 9 (1993), pp. 62-71.

Bloom, B.S. et al. "A Re-Appraisal of Hepatitis B Virus Vaccination Strategies Using Cost Effectiveness Analysis". Annals of Internal Medicine. Vol. 118, No. 4, pp. 298-306. (1993)

Kamath, C.C. et al. "The Cost-Effectiveness of Acetaminophen, NSAIDs, and Selective COX-2 Inhibitors in the Treatment of Symptomatic Knee Osteoarthritis." Value in Health. Vol. 6, No. 2 (2003), pp. 144-157.

Postma, M.J. et al. "Cost-Effectiveness of Partner Pharmacotherapy in Screening Women for Asymptomatic Infection with Chlamydia Trachomatis." Value in Health. Vol. 4, No. 3 (2001), pp. 266-275.

Dittus, R.S. et al. "Medical Resident Work Schedules: Design and Evaluation by Simulation Modeling." Management Science. Vol. 42, No. 6 (1996), pp. 891-906.

Sulat, P.S. et al. "Data and Simulation Modeling to Determine the Estimated Number of Primary Care Beds in Oklahoma." Topics in Health Information Management. Vol. 19, No. 4, pp. 36-46.

Borg, S. et al. "A Computer Simulation Model of the Natural History and Economic Impact of Chronic Obstructive Pulmonary Disease." Value in Health. Vol. 7, No. 2 (2004), pp. 153-167.

Any student that chooses to select another article or study that is not included within this list will be required to obtain instructor approval prior to beginning this assignment. It is anticipated that the final article summary will be around 5-10 double spaced pages. Submitted summaries will be graded based upon the validity of the responses as well as appropriate use of grammar and spelling throughout the document.

Problem Assignments

In addition, students will be assigned selected problems from the textbook and/or from additional operations research/management science sources to coincide with the material covered in the lecture and demonstration part of the class. The purpose of these assignments is to allow the student an opportunity to gain valuable experience in the use of spreadsheet software (MS-Excel) to model commonly occurring operational problems in health care, using selected operational research methods and techniques, so as to derive potential solutions to improve operational performance (e.g. reduce costs, increase productivity, output, quality, etc.). While it will be important for students to grasp the fundamentals of using spreadsheet software to develop various models for this purpose, arguably the most important learning outcome of these assignments is for students to develop/refine their ability to take the results of the modeling process and interpret their meaning for purposes of managerial / business decision making. Problems will be selected that emphasize BOTH modeling as well as interpretation issues. Submitted problems will be graded based on both accuracy as well as completeness of responses.

Student Performance / Conduct Expectations

At each registration, students must agree to abide by the rules of the Honor Code and the Code of Conduct. The Honor Code and Code of Conduct are printed in the AASU Catalog, Students Illustrated and on the University website. Any student desiring assistance with any matter related to these Codes is invited to seek assistance in the Division of Student Affairs.

Commensurate with their obligations associated with adherence to these defined codes of conduct, all students in this course are expected to:

1. Exercise honesty in all matters, both academic and personal in nature.
2. Be fair and courteous with others, treat them fairly and with respect, showing sensitivity to cultural, ethnic, and religious diversity and personal dignity.
3. Accept personal responsibility for appropriate behavior as defined by the Codes.
4. Know the offenses under each Code and the penalties for violating them.
5. Understand that they are responsible for knowing and following any additional written or verbal requirements given by the professor, which relate to honor or conduct and which are inherent to the classroom or University functions.

Student Performance / Conduct Expectations (continued)

6. Know what plagiarism is, as defined under the Honor Code; recognize that it undermines individual and academic integrity and ensure that it is avoided in both spirit and deed.

7. Understand that the Codes apply at all University activities whether on the main campus or at other locations.

8. Remember that they are representatives of Armstrong Atlantic State University and that they must always conduct themselves in a manner that brings credit upon themselves and the University.

Any student determined to be in violation of one or more of the provisions of these codes will be subject to all proscribed academic and/or disciplinary penalties as outlined in the Code of Student Conduct. Lastly, it should be noted that student ignorance of the specific provisions within the Code of Student Conduct is not an acceptable defense in any such proceedings. Students should thus exercise particular care to refrain from any activity or behavior that has the appearance of constituting a violation of the Code.

Provisions for Students with Disabilities

All students that have a documented disability, whether permanent or temporary, that will impact significantly on their ability to be successful in this course, are encouraged to discuss the disability with me to allow for appropriate assistance through the Office of Disability Services. All inquiries will be strictly confidential.

Tentative Course Schedule (subject to change)

<u>Date</u>	<u>Topics Covered</u>	<u>Winston/Albright</u>
8/22	Course Introduction Historical evolution of operations management Operations management (OM) in health care Information technology and OM Overview of systems theory	Ch. 1

Problem Assignments (optional):

Microsoft Excel Tutorial (“Excel Tutorial To Improve Your Efficiency”), located on Student CD that accompanies the textbook (Excel Tutorial.doc).

8/29	Information technology and OM (continued) Fundamentals of data management Database models and management systems Administrative database applications Clinical database applications Strategic decision support applications	Ch. 2 (for 8/30)
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Problem Assignment(s) (optional):

Continue with Microsoft Excel Tutorial from Week One

9/5	Introduction to spreadsheet modeling Basic spreadsheet modeling concepts Illustration of modeling examples Introduction to optimization modeling	Ch. 2, 3
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Problem Assignments:

Ch. 2 -- #20, 27 (a-c), 29, 33

Ch. 3 -- #35

Tentative Course Schedule (subject to change)

<u>Date</u>	<u>Topics Covered</u>	<u>Winston/Albright</u>
9/12	Optimization modeling principles Linear programming (LP) applications Workforce scheduling models Data envelopment analysis	Ch. 3, 4

Problem Assignments:

Ch. 4 -- #59, 60, 85, 130, 132

9/19	Optimization modeling (continued) Integer programming applications Capital budgeting models Fixed cost models Set covering and location assignment models	Ch. 6
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Problem Assignments:

Ch. 6 -- 39, 40, 47, 78, 92 (a-d)

9/26	Optimization modeling principles Goal programming (GP) principles and applications Pareto optimality and goal tradeoffs	Ch. 9
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Problem Assignments:

Ch. 9 – #2, 21

10/3	Decision making under uncertainty/risk Principles and methods of decision analysis Single-stage decision models Multi-stage decision models	Ch. 10
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Case/Problem Assignments:

Chapter 10 -- #43, 50, 65

Tentative Course Schedule (subject to change)

<u>Date</u>	<u>Topics Covered</u>	<u>Winston/Albright</u>
10/10	Introduction to Simulation Modeling Random number generation methods Simulation modeling with MS Excel Simulation modeling with MS Excel Add-Ins	Ch. 11

Problem Assignments:

Ch. 11 -- #41 (a-b)

10/17	Decision making under uncertainty/risk (cont'd) Simulation Applications in health care Operational simulation model applications Optimization simulation models	Ch. 12
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Problem Assignments:

Ch. 12 -- #44 (a-b), 57(a-d)

10/24	Decision making under uncertainty/risk (cont'd) Inventory Management Models EOQ-based Models Inventory Simulation Models	Ch. 13
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Problem Assignments:

Ch. 13 -- #28 (a-c), 38, 56

10/31	Decision making under uncertainty/risk (cont'd) Introduction to Project Management Models Critical Path Method (CPM) Models	Ch. 15
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Problem Assignments:

Ch. 15 -- #25, 30

Tentative Course Schedule (subject to change)

<u>Date</u>	<u>Topics Covered</u>	<u>Winston/Albright</u>
11/7	Operations research topic – TBA	TBA

Problem Assignments:

TBA

11/14:	Operations research topic – TBA Distribute course examination (tentative)	TBA
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11/21 Thanksgiving Holiday – No class

11/28 **Course examination due (tentative)**
Course Evaluations (tentative)