Program Revision Proposal:
Creating New Program(s) from Existing Program(s)

Form 3B

This form should be used to seek SUNY's approval to create one or more new programs from existing, registered programs. *A campus is not required to submit a Program Announcement (PA) or a Letter of Intent (LI) for these types of new programs.* The Chief Executive or Chief Academic Officer should submit **a signed cover letter and this completed form** to the SUNY Provost at program.review@suny.edu.

Section 1. General Information	
a) Institutional Information	1. Institution Name: Binghamton University 2. Institution's 6-digit SED Institution Code: 211000 3. Institution's Address: 4400 Vestal Pkwy E, Binghamton, NY 13902 4. *Additional Information: Specify each campus and its 6-digit SED Institution Code where the program is registered and where the proposed changes would apply:*
b) Contact Person for This Proposal	Name and title: Susan Strehle, Vice Provost and Dean, Graduate School Telephone: 607-777-2070 E-mail: sstrehle@binghamton.edu
c) CEO (or designee) **Approval** .	**Signature affirms that the proposal has met all applicable campus administrative and shared governance procedures for consultation, and the institution's commitment to support the program as revised.** Name and title: Donald Nieman, Executive Vice President of Academic Affairs & Provost Signature and date:
	If the revised program will be registered jointly[1] with one more other institutions, provide the following information for each partner institution. The signature confirms support of the changes.
	Partner institution's name: Name and title of partner institution's CEO: Signature of partner institution's CEO:

Version 2013-10-17

[1] If the partner institution is non-degree-granting, see SED CEO Memo 94-04. .

Section 2. Multi-Award and Multi-Institution Programs

Check one.

[ ] This proposal is for a **multi-award program** that leads to two separate awards (e.g., A.S./B.A., B.S./M.S.). **Complete Part 2A, below.** ***NOTE:*** *Such programs generally involve special admissions for students who have the capacity to complete all awards, curricular integration between the component programs, and shortened time to degree compared to taking the programs separately.*

[ ] This proposal is for a **multi-institution program** (also called a "jointly registered program") to be offered jointly by two or more institutions. **Complete Part B, below**. ***NOTE:*** *Such programs involve a formal agreement between two or more institutions to offer courses leading to an award.*

[ ] This proposal is for a **multi-institution, multi-award program** to be offered jointly by more two or more institutions and lead to two separate awards. **Provide a single, consolidated response that reflects all the items in Parts 2A and 2B, below.**

PART 2A – Multi-Award Program

a) Program Title:

b) Program Awards ((e.g., B.A./M.S.) from existing programs):

c) Proposed HEGIS Code:

d) Required Number of Credits: Minimum [ ] If tracks or options, largest minimum [ ]

e) **Format**: [ ] Day [ ] Evening [ ] Weekend [ ] Evening/Weekend [ ] Not Full-Time

f) **Mode**: [ ] Standard [ ] Independent Study [ ] External [ ] Accelerated

[ ] Distance Education (**If 50% of more of the program can be completed via distance education, append a *Distance Education Format Proposal* at the end of this form.**)

g) **Other**: [ ] Bilingual [ ] Language Other Than English [ ] Upper Division Program [ ] Cooperative

4.5 year [ ] 5 year

h) List registered programs at the institution identified in Section 1 whose courses will contribute to this program. Add rows as needed.

	Program Title	Award	SED Program Code
Program 1			
Program 2			

i) List all the courses required for each existing program, and indicate which ones will be counted toward both awards.

j) What is the length of time students will have to complete the proposed program?

k) What are the admissions requirements for the new program, and how are they related to student success?
l) Complete a ***SUNY Sample Program Schedule*** to show how students will be able to schedule all required courses to complete the multi-award program.

PART 2B – Multi-Institution Program

a) Program Title:

b) Are all partner institutions listed in Section 1, with CEO information and a signature for each partner?

[ ] Yes [ ] No

c) Proposed HEGIS Code:

g) Required Number of Credits: Minimum [ ] If tracks or options, largest minimum [ ]

d) **Format**: [ ] Day [ ] Evening [ ] Weekend [ ] Evening/Weekend [ ] Not Full-Time

e) **Mode**: [ ] Standard [ ] Independent Study [ ] External [ ] Accelerated

[ ] Distance Education (**If 50% of more of the program can be completed via distance education, append a Distance Education Format Proposal at the end of this form.**)

f) **Other**: [ ] Bilingual [ ] Language Other Than English [ ] Upper Division Program [ ] Cooperative

4.5 year [ ] 5 year

g) List all courses in the program and indicate which courses will be completed at each institution.

h) Describe the administrative provisions for coordinating admissions, advisement and financial aid for the program between the two institutions.

i) Describe the program's policies governing residency requirements and tuition charges.

j) Explain any other special arrangements or requirements arising from the multi-institution nature of the program.

k) Complete a ***SUNY Sample Program Schedule*** to show how students will be able to schedule all required courses to finish the program.

Section 3. New Programs from Options, Concentrations or Tracks in an Existing Program

This section should be used to propose the creation of new programs from options, concentrations or tracks in existing, registered programs, which is sometimes called "disaggregation." This section enables (but does not require) a campus to make the following types of revisions to an existing track at the same time the track becomes a separate program:

- new or significantly revised courses; and
- changes to the track's admissions standards and program evaluation elements.

NOTE: *A new program proposal must be submitted – instead of this section – when:*

- *the new program(s) will be offered at a different location than the campuses identified in Section 1; or*
- *a Master Plan Amendment is required for the new program(s).*

PART 3A – REVISION OF EXISTING PROGRAM

a) Title: Health Systems concentration in (1) Industrial and Systems Engineering or (2) Systems Science

b) Award: Master of Science

c) HEGIS Code: 0913.00 (Industrial and Systems Engineering); 4904.00 (Systems Science)

d) SED Program Code: 82485 (Industrial and Systems Engineering); 13740 (Systems Science)

e) List the registered Options, Concentrations or Tracks and indicate which, if any, will be removed.

None: this application is not meant to remove any existing program or concentration, including the preceding concentrations above from which the new degree is being derived.

f) If the existing program will have any changes to the program's admissions standards or program evaluation elements, please describe them and explain why they are needed. Otherwise, affirm that the admissions standards and evaluation methods are unchanged from the current registered program.

The admissions standards and evaluation methods are unchanged from the current registered programs.

PART 3B – PROPOSED NEW PROGRAM(S)

Provide the information requested below for each proposed new program to be registered separately.

The program below is being submitted for offering in addition to current programs and concentrations; as stated in part 3A, this proposal is not meant to remove or replace any existing program or concentration.

a) Title: Healthcare Systems Engineering

b) Award: Master of Science

c) HEGIS Code: 4904.00

d) Required Credits: Minimum [30] If tracks or options, largest minimum [30]

The 30 credits total will be comprised of the following core/required courses:

- SSIE 505 Applied Probability & Statistics (3 credits)
- SSIE 520 Modeling & Simulation (3 credits)
- SSIE 534 Fundamentals of Health Systems (3 credits)
- SSIE 537 Industrial & Systems Engineering in Healthcare (3 credits)

- SSIE 538 Healthcare Finance & Accounting (3 credits)
- SSIE 561 Quality Assurance for Engineers (3 credits)

Upon completing the core requirements, students will be able to complete their program with one of the following three options to attain eligibility for degree conferral:

- Coursework Option: 3 Electives (3 credits each) and SSIE 637 Advanced Topics in Health Systems (3 credits). SSIE 637 includes significant project-based coursework to serve as capstone for the termination requirement of the program
- Project Option: SSIE 598 Project (3 credits) and 3 Electives (3 credits each, including one at the 600-level)
- Thesis Option: SSIE 599 Thesis (6 credits) and 2 Electives (3 credits each, including one at the 600-level)

e) Describe the new program and the rationale for converting the existing coursework to a separately registered program.

Health systems engineering has a new urgency, as well as increasing demand. While Binghamton University has been offering concentrations in health systems within existing master's programs (in Industrial and Systems Engineering and Systems Science), we propose now to establish a new Master of Science degree in Health Systems Engineering. With more focus and more opportunities to study the various of systems engineering in health systems, students will benefit from expanded understanding of the field.

The increasing need for health systems engineering is demonstrated in reports such the President's Council of Advisors on Science and Technology (PCAST) report "Better Health Care and Lower Costs: Accelerating Improvement through Systems Engineering" (May 2014), and more recently the public release of the National Academy of Sciences (NAS, formerly IOM) reports on "Transforming Health Care Scheduling and Access: Getting to Now" (June 2015) and "Diagnostic Error in Health Care" (September 2015). With an increased emphasis on better services and greater efficiency in health care, the demand for health systems engineers has been growing. More employers seek professionals with this health systems engineering skill set, and more engineering students now demand a contemporary, specialized program in health systems engineering with a title matching their educational training.

This new Master of Science degree in Health Systems Engineering is being put forth to satisfy demand from employers and students. It builds on existing coursework from the concentrations approved in 2011, together with specialized coursework in health systems that has been added to the list of concentration electives over the past five years.

f) If the new program will have any new or significantly revised courses, list them here and attach a syllabus for each one.

As focus in health systems engineering has increased at Binghamton University, the Department of Systems Science and Industrial Engineering has developed and offered appropriately specialized courses in addition to the traditional core courses of the industrial and systems engineering concentration previously approved. Some foundational courses related to health systems engineering within the pre-existing health systems concentrations include:

- SSIE 530 Healthcare Policy Analysis
- SSIE 534 Fundamentals of Health Systems
- SSIE 537 Industrial & Systems Engineering in Healthcare

- SSIE 538 Healthcare Finance & Accounting
- SSIE 539 Human Factors Engineering in Healthcare*
- SSIE 637 Advanced Topics in Health Systems*

As all but two of these courses are new or significantly revised since the previously approved concentrations, syllabi are included in the appendix. Pre-existing courses are marked with asterisks above.

g) If the new program will have any changes to the program's admissions standards or program evaluation elements, please describe them and explain why they are needed. Otherwise, affirm that the admissions standards and evaluation methods are unchanged from the current registered program.

Admissions requirements will be identical to the present Master of Science in Industrial and Systems Engineering with concentration in Health Systems from which this new program is evolving.

h) Explain the expected impact of the new program on existing programs.

This new program is not anticipated to have significant impact on the existing programs as there is still great demand for the standard industrial and systems engineering graduate degrees, as well as for the Master of Science in Industrial and Systems Engineering with concentration in Health Systems. While we believe the new offering will attract more students who want this distinct specialization, we anticipate continued demand for the Master of Science in Industrial and Systems Engineering with concentration in Health Systems. Student feedback suggests that some students want the broader existing degree programs, believing they may lead to employment in a wider array of industries upon graduation, while others prefer to specialize in health systems. There is continuing demand for the present degree offerings as well as this new degree.

i) Describe adjustments the institution will make to its current resource allocations to support the new program.

No additional resources will be required for this new program offering as it will utilize the same faculty, materials, labs and other resources as our currently existing healthcare concentrations.

j) Complete the appropriate ***Sample Program Schedule*** to show how students can complete all required courses in the new program.

SUNY Graduate Sample Program Schedule (*OPTION: You can insert an Excel version of this schedule AFTER this line, and delete the rest of this page.)*
Program/Track Title and Award: Health Systems Engineering

a) Indicate **academic calendar** type: [√] Semester [ ] Quarter [ ] Trimester [ ] Other (describe):

b) **Label each term in sequence**, consistent with the institution's academic calendar (e.g., Fall 1, Spring 1, Fall 2)

c) Use the table to show **how a typical student may progress through the program**; copy/expand the table as needed.

d) Complete the last row to show program totals and comprehensive, culminating elements. **Complete all columns that apply to a course.**

Thesis Option

Term 1: FALL Year 1					**Term 2: SPRING Year 1**			
Course Number & Title	**Credits**	**New**	**Co/Prerequisites**		**Course Number & Title**	**Credits**	**New**	**Co/Prerequisites**
SSIE 505, Applied Probability & Statistic	3		N/A		SSIE 520, Modeling & Simulation	3		SSIE 505 or equivalent
SSIE 534, Fundamentals of Health Systems	3		N/A		SSIE 561, Quality Assurance for Engineers	3		N/A
SSIE 537, Industrial and Systems Engineering in Healthcare	3		N/A		SSIE 538, Healthcare Finance & Accounting	3		N/A
Elective – Health Systems	3				Elective – Health Systems, 600-level course	3		
Term credit total:	12				Term credit total:	12		
Term 3: FALL Year 2					**Term 4:**			
Course Number & Title	**Credits**	**New**	**Co/Prerequisites**		**Course Number & Title**	**Credits**	**New**	**Co/Prerequisites**
Thesis – 6 credits min	6							
Term credit total:	6*				Term credit total:			

Program Total:	**Total Credits: 30**	**Identify the required comprehensive, culminating element(s), such as a thesis or examination, including course number(s), if applicable:** **This program option will culminate with a thesis (SSIE 599).**

New: X if new course **Prerequisite(s)**: list prerequisite(s) for the listed courses

*Accommodations will be made for students needing to maintain full-time status.

SUNY Graduate Sample Program Schedule (*OPTION: You can insert an Excel version of this schedule AFTER this line, and delete the rest of this page.)*
Program/Track Title and Award: Health Systems Engineering

e) Indicate **academic calendar** type: [√] Semester [ ] Quarter [ ] Trimester [ ] Other (describe):

f) **Label each term in sequence**, consistent with the institution's academic calendar (e.g., Fall 1, Spring 1, Fall 2)

g) Use the table to show **how a typical student may progress through the program**; copy/expand the table as needed.

h) Complete the last row to show program totals and comprehensive, culminating elements. **Complete all columns that apply to a course.**

Project Option

Term 1: FALL Year 1				**Term 2: SPRING Year 1**			
Course Number & Title	**Credits**	**New**	**Co/Prerequisites**	**Course Number & Title**	**Credits**	**New**	**Co/Prerequisites**
SSIE 505, Applied Probability & Statistic	3		N/A	SSIE 520, Modeling & Simulation	3		SSIE 505 or equivalent
SSIE 534, Fundamentals of Health Systems	3		N/A	SSIE 561, Quality Assurance for Engineers	3		N/A
Elective – Health Systems	3			SSIE 537, Industrial and Systems Engineering in Healthcare	3		N/A
Elective – Health Systems	3			SSIE 538, Healthcare Finance & Accounting	3		N/A
Term credit total:	12			Term credit total:	12		
Term 3: FALL Year 2				**Term 4:**			
Course Number & Title	**Credits**	**New**	**Co/Prerequisites**	**Course Number & Title**	**Credits**	**New**	**Co/Prerequisites**
Elective – Health Systems, 600-level course	3						
Project – 3 credits min	3						
Term credit total:	6*			Term credit total:			

Program Total:	**Total Credits: 30**	**Identify the required comprehensive, culminating element(s), such as a thesis or examination, including course number(s), if applicable: This program option will culminate with a project (SSIE 598).**

New: X if new course **Prerequisite(s)**: list prerequisite(s) for the listed courses

*Accommodations will be made for students needing to maintain full-time status.

SUNY Graduate Sample Program Schedule (*OPTION: You can insert an Excel version of this schedule AFTER this line, and delete the rest of this page.)*
Program/Track Title and Award: Health Systems Engineering

i) Indicate **academic calendar** type: [√] Semester [ ] Quarter [ ] Trimester [ ] Other (describe):

j) **Label each term in sequence**, consistent with the institution's academic calendar (e.g., Fall 1, Spring 1, Fall 2)

k) Use the table to show **how a typical student may progress through the program**; copy/expand the table as needed.

l) Complete the last row to show program totals and comprehensive, culminating elements. **Complete all columns that apply to a course.**

Coursework-Only Option

Term 1: FALL Year 1				**Term 2: SPRING Year 1**			
Course Number & Title	**Credits**	**New**	**Co/Prerequisites**	**Course Number & Title**	**Credits**	**New**	**Co/Prerequisites**
SSIE 505, Applied Probability & Statistic	3		N/A	SSIE 520, Modeling & Simulation	3		SSIE 505 or equivalent
SSIE 534, Fundamentals of Health Systems	3		N/A	SSIE 561, Quality Assurance for Engineers	3		N/A
Elective – Health Systems	3			SSIE 537, Industrial and Systems Engineering in Healthcare	3		N/A
Elective – Health Systems	3			SSIE 538, Healthcare Finance & Accounting	3		N/A
Term credit total:	12			Term credit total:	12		
Term 3: FALL Year 2				**Term 4:**			
Course Number & Title	**Credits**	**New**	**Co/Prerequisites**	**Course Number & Title**	**Credits**	**New**	**Co/Prerequisites**
Elective – Health Systems	3						
SSIE 637 Advanced Topics in Health Systems	3						
Term credit total:	6*			Term credit total:			

Program Total:	**Total Credits: 30**	**Identify the required comprehensive, culminating element(s), such as a thesis or examination, including course number(s), if applicable: This program option will culminate with completion of SSIE 637 Advanced Topics in Health Systems, which includes significant project-based coursework to serve as capstone for the program (and termination requirement).**

New: X if new course **Prerequisite(s)**: list prerequisite(s) for the listed courses

*Accommodations will be made for students needing to maintain full-time status.

Section 4. SUNY Faculty Table

a) If applicable, provide information on faculty members who will be teaching new or significantly revised courses in the program. Expand the table as needed.

b) Append at the end of this document position descriptions or announcements for each to-be-hired faculty member.

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title/Rank (Include and identify Program Director with an asterisk.)	**% of Time Dedicated to This Program**	**Program Courses Which May Be Taught (Number and Title)***	**Highest and Other Applicable Earned Degrees (include College or University)**	**Discipline(s) of Highest and Other Applicable Earned Degrees**	**Additional Qualifications: List related certifications, licenses and professional experience in field.**
PART 1. Full-Time Faculty					
Dr. Mohammad Khasawneh*	20%	SSIE 530 SSIE 534 SSIE 537 SSIE 539 SSIE 633 SSIE 637	Ph.D., 2003, Clemson University, M.Sc., 2000, Jordan University of Science and Technology B.Sc., 1998, Jordan University of Science and Technology	Industrial Engineering, Mechanical Engineering	Lean Six Sigma Green and Black Belt Instructor Director, Healthcare Systems Engineering Center Associate Director for the Watson Institute for Systems Excellence Graduate Director, Executive Master of Science in Health Systems Program Chancellor's Award for Excellence in Teaching
Dr. Nagen Nagarur	10%	SSIE 505 SSIE 525 SSIE 537 SSIE 538 SSIE 561	Ph.D., 1998, Virginia Polytechnic Institute and State University, M.S., 1980, Wichita State University, B.TECH., 1976, Regional Engineering College	Industrial Engineering and Operations Research, Industrial Engineering, Chemical Engineering	Assistant Director for the Watson Institute for Systems Excellence Lean Six Sigma Green and Black Belt Instructor
Dr. Sarah Lam	10%	SSIE 505 SSIE 520 SSIE 522 SSIE 621 SSIE 631	Ph.D., 1999, University of Pittsburgh M.S., 1995, University of Delaware B.A., 1991, City University of Hong Kong	Industrial Engineering, Operations Research, Quantitative Analysis for Business	Associate Dean for the Graduate School Assistant Director for the Watson Institute for Systems Excellence Chancellor's Award for Excellence in Teaching
Dr. Daryl Santos	15%	SSIE 511 SSIE 553 SSIE 561 SSIE 661	Ph.D., 1993, University of Houston M.S., 1990, University of Houston B.S., 1987, Cornell	Industrial Engineering, Operations Research & Industrial Engineering	Vice Provost for Diversity and Inclusiveness Assistant Director for the Watson Institute for Systems Excellence Chancellor's Award for

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title/Rank (Include and identify Program Director with an asterisk.)	**% of Time Dedicated to This Program**	**Program Courses Which May Be Taught (Number and Title)***	**Highest and Other Applicable Earned Degrees (include College or University)**	**Discipline(s) of Highest and Other Applicable Earned Degrees**	**Additional Qualifications: List related certifications, licenses and professional experience in field.**
			University		Excellence in Teaching Chancellor's Award for Excellence in Scholarship and Creative Activities
Dr. Huiyang Li	15%	SSIE 530 SSIE 534 SSIE 537 SSIE 539	Ph.D., 2013, University of Michigan - Ann Arbor M.S.E., 2010, University of Michigan - Ann Arbor M.S., 2008, Chinese Academy of Sciences B.S., 2005, Peking University	Industrial and Operations Engineering, Industrial and Operations Engineering, Applied Psychology, Electronic and Information Science and Technology	Session Co-Chair, HFES Annual Meeting 2012-2015 Industrial Engineering and Management Journal Board Editor Distinguished Leadership Award, College of Engineering, University of Michigan
Dr. Sung Hoon Chung	15%	SSIE 505 SSIE 519 SSIE 520	Ph.D., 2011, Pennsylvania State University M.S., 2001, Yonsei University B.S., 1999, Yonsei University	Engineering and Operations Research, Mechanical Engineering, Mechanical Design and Production Engineering	Recipient of two Individual Development Awards Nomination for New Faculty Colloquium, INFORMS Session Chair at INFORMS 2015
Dr. Nasim Sabounchi	15%	SSIE 530 SSIE 534 SSIE 537	Ph.D., 2012, Virginia Polytechnic Institute and State University, Northern Virginia Center M.Sc., 2006, Amirkabir University of Technology (Tehran Polytechnic) B.Sc., 2004, Amirkabir University of Technology (Tehran Polytechnic)	Industrial and Systems Engineering in the area of Management Systems, Industrial Engineering, Industrial Engineering Specialized in Systems Programming	Systems Science Scholarship Recipient, Academy of Health – Robert Wood Johnson Foundation June 2015 Session Chair IISE 2015 Modeler, Social System Design Laboratory, George Warren Brown School of Social Work, Washington University in St. Louis

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title/Rank (Include and identify Program Director with an asterisk.)	**% of Time Dedicated to This Program**	**Program Courses Which May Be Taught (Number and Title)***	**Highest and Other Applicable Earned Degrees (include College or University)**	**Discipline(s) of Highest and Other Applicable Earned Degrees**	**Additional Qualifications: List related certifications, licenses and professional experience in field.**
Part 2. Part-Time Faculty					
Part 3. Faculty To-Be-Hired (List as TBH1, TBH2, etc., and provide title/rank and expected hiring date.)					

APPENDICES

Appendix I: Syllabi for Healthcare Systems Engineering Focused Courses

Appendix II: Course Descriptions for Other (Core and Elective) Program Courses

Appendix I: Syllabi for Healthcare Systems Engineering Focused Courses

- SSIE 530 Healthcare Policy Analysis
- SSIE 534 Fundamentals of Health Systems
- SSIE 537 Industrial & Systems Engineering in Healthcare
- SSIE 538 Healthcare Finance & Accounting
- SSIE 539 Human Factors Engineering in Healthcare*
- SSIE 637 Advanced Topics in Health Systems*

*Course was pre-existing and not significantly modified to enable provision of the health systems engineering programs.

Thomas J. Watson School of Engineering and Applied Science
Systems Science and Industrial Engineering

State University of New York at Binghamton

SPRING 2015

SSIE 530 - Health Care Policy Analysis

CREDIT HOURS	**3**
INSTRUSTOR	Nasim Sabounchi, PhD (Sabounchi@binghamton.edu)
TEACHING ASSISTANT	Fatima Irshaidat (Firshai1@binghamton.edu)
OFFICE	Engineering Building - Room S11
CLASSROOM	Engineering Building, Room J23
TIME	Tuesdays 1:15 - 2:40 PM Thursdays 1:15 - 2:40 PM
GRADE	L/G
OFFICE HOURS	***Walk-In Time:*** Mondays 1:30 – 3 pm. Wednesdays 1:30 – 3 pm ***By Appointment:*** In addition to the above office hours, the instructor will see students at other time by appointment

I. COURSE DOMAIN AND LEARNING OBJECTIVES

This course provides an overview of issues and policies related to health care systems, with emphasis on health care systems within the United States. The focus of this course is on understanding problems facing health organizations and healthcare systems and designing sustainable health policies and programs by using systems engineering modeling tools and analytical approaches. The course will focus on substantive areas that form the basis for many of the issues in health policy and analysis. Some of the topics covered include access to care, insurance markets, health economics, mental health policy, health manpower, and health systems more generally, in the United States. ***Prerequisites for this coure are SSIE 534 or ISE 434.***

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

1. Define policy and describe the policy-making process in the United States.
2. Understand health and its key determinants as it is broadly conceptualized in the U.S. and the developed world.
3. Understand and describe the role of the legal system in the formulation and implementation of the multiple forms of health policy.
4. Demonstrate basic skills in health policy analysis
5. Appreciation for systems thinking and how stock-and-flow and feedback structures containing delays and non-linear relationships can create non-intuitive behaviors over time, and therefore demand simulation for better thinking about, and solutions to, dynamically complex problems.
6. Understand where to get information and data about health and health care.
7. Understand the core elements of health policy-making including the roles of government and major stakeholders and major statutes affecting health care.
8. Describe contemporary policy issues in health care delivery including the role of managed care, quality of care, privacy and consumer protections.
9. Analyze, evaluate, and design options for reform of the health care system

II. ACADEMIC POLICIES

Professional Conduct: All students are expected to practice and display a high level of personal and professional integrity. The policies of the Thomas J. Watson School of Engineering and Applied Science will be followed. Any minor unprofessional behavior to instructors, teaching assistants, or course assistants will result in reduction in overall grade per occurrence. Any major

unprofessional behavior to instructors, teaching assistants, or course assistants will result in a failing grade and a hearing before the Watson School Academic Integrity Committee and could result in dismissal from the University.

Academic Honesty: We shall not tolerate lying, cheating, or stealing in any form. **All assignments (homework, projects, etc) should reflect your own individual effort unless the instructor has specifically stated that the work is to be completed in teams.** Also, students will abide by Binghamton University's policy on academic honesty listed in the University Bulletin. Failure to abide by this policy may result in a zero grade in the assignment/exam/project or an F in the course, or may even have worse consequences, depending on the circumstances. The University guidelines will be strictly followed.

Absent Professor: Students will be notified in advance if the instructor is going to be late for class. However, if no arrangements have been made, and if an unscheduled conflict or emergency occurs which prevents the instructor (or someone else to cover for him) from meeting the class, the students are authorized to leave after waiting for 15 minutes.

Special Needs: If you have a learning disability, sensory, or physical disability or other impairment, and you may need special assistance in lectures, reading, written assignments, and/or exam taking, please contact Services for Students with Disabilities via http://www.binghamton.edu/ssd/ or Binghamton University, P.O. Box 6000, Binghamton, NY 13902-6000, office: UU-119, phone: 607-777-2686 (voice/TTY), fax 607-777-6893, or e-mail ssd@binghamton.edu. This office can provide coordination of accommodations at Binghamton University. The Services for Students with Disabilities, a University-wide resource, provides diagnostic and academic accommodations support and referrals.

PROFESSIONAL USE OF TECHNOLOGY DURING CLASS: While note-taking on computers can be an appropriate learning tool, it can also detract from attention to class discussions and the quality of participation. The instructor retains the right to ask students to not use computers during portions of the class. At all times, students are encouraged to consider the impact of their in-class use of computers on the learning environment for themselves, their classmates and the instructor. Texting, checking e-mail or using the computer or internet for personal or non-class related purposes during class time is never appropriate and will be immediately addressed by the instructor.

English Language Proficiency: If your English language proficiency is such that you may need special assistance in lectures, reading, written assignments, and/or exam taking, please communicate these needs to your instructor who may refer you to the English as a Second Language (ESL) program, online at http://www.binghamton.edu/esl/, which is a University-wide resource which provides classes and academic English language support designed to increase non-native English speaking students' English language proficiency and to facilitate their academic success at Binghamton University. You may also find the Academic Assistance resources available through the Office of International Student and Scholar Services online aat http://www.binghamton.edu/isss/ to be helpful.

III. READINGS

Required Texts:

- Curtis P. McLaughlin and Craig D. McLaughlin (2015- Second Edition) **Health Policy Analysis: An Interdisciplinary Approach,** Jones and Bartlett Publishers.
- Sterman J.D., 2000, **Business Dynamics: Systems Thinking and Modeling for a Complex World**, Boston: McGraw-Hill Higher Education
- Supplemental articles will be provided by instructor, mostly through the blackboard.

IV. ROLE OF FACULTY AND STUDENTS

Course Expectations: The **instructor** will: prepare and deliver course material; be available to students during office hours, after class, and by appointment for consultation; and provide timely and clearly explained feedback on student performance. The instructor expects **students** to be responsible for the material covered in class ***regardless of whether the student is in class or not***; complete all assignments in a timely manner; come to class prepared, having read all assignments; participate in class discussions; participate in team meetings outside of class; seek any necessary clarification regarding course expectations and assignments from the instructors; provide the instructors with feedback about the effectiveness of the course; and, take an active role in shaping a positive course experience. **Any problems with meeting deadlines or completing assignments should be discussed promptly with the instructors**.

Although there is no required attendance or participation grade as such, it is unlikely that one will be able to succeed in this course by simply reading the text and completing assignments. It is through discussion and exercises that one acquires a shared understanding of key concepts, and develops the ability to recognize variations and innovative ideas.

Each student project team will also need to meet on a weekly basis outside of class in order to be able to successfully complete the final project by the end of the semester. It is therefore highly recommended that teams identify a regular weekly meeting time.

V. GRADING CRITERIA

The final grade will be determined by the following percentage distribution:

Item	Percentage of final grade
Team Assignments	25
Mid-term exam	25
Final Team Project (including presentations)	40
Peer Review of Team-member Participation	10
Instructor Review of Individual Participation	5
Total	105%

Final Grade Scale: A (100-97) A- (96-93) B+ (92-89) B (88-85) B- (84-80) C+ (79-78) C (77-74) C- (73-70) F (69 and below).

VI. COURSE OUTLINE

Make sure you review the updated syllabus before starting with the weekly readings. In general it is better to stay ahead of the readings so that you distribute them evenly between alternate weeks.

The following course outline provides a list of topics, readings, and exercises and assignments for each class of the semester.

Reading Guidelines:

- C&C Ch. 2 = Read Chapter 2 of "**Health Policy Analysis: An Interdisciplinary Approach**" by McLaughlin and McLaughlin (2015- Second Edition).
- Sterman Chap 1 = Read Chapter 1 of "**Business Dynamics: Systems Thinking and Modeling for a Complex World**" by Sterman (2000)
- BB = The reading material is available from blackboard.
- TBA: Other Reference Materials (To Be Assigned) Instructor will make supplemental reading assignments. These reference materials will include current articles, books and web site materials.

1) Workbook exercise sets (weekly, no grade)

   Each week there will be a set of workbook exercises to practice applying system dynamics concepts and skills. Each exercise will draw on topics that have appeared in the text, lectures, and in-class exercises. Exercises provide an opportunity to test one's own understanding of the material and apply the principle or practice to one's own area of interest. Exercises will be distributed each week with the solutions key distributed the following week. While exercises are not a required component of the grade, students are *strongly encouraged* to do the exercises and compare answers against the solution key to self-assess learning.

2) Team Assignments (25%):

   All assignments will be posted in the Assignments Folder on blackboard. You should submit your work using blackboard. Please be sure to include your team name in the file name of any document you submit. Assignments are due one week after the assignment date except where otherwise noted.

3) Midterm Exam (25%)

   There will be one close-book, close-notes, no calculator exam given during the semester: the midterm. The exam will cover material up to the week prior to the exam and involve a combination of multiple choice, short-answer, problem solving, and essay. The midterm will effectively cover the first half of the course.

4) Team Project: Team Work on the ReThink Health Policy Challenge (40%)

This class provides a challenge experience for applying what you learn in this course for solving an important complex health policy problem. Working in teams of four to five students each, your assignment will be to redesign the delivery of health care in the "Anytown" region. Anytown is a statistically constructed region that has the general demographic, health delivery and health outcomes of the US in general (it is a small regional replica of the United States). Your team will interact with the ReThink Health Dynamics simulation module that has been developed by the Ripple Foundation to support regional health care reform across the United States. The overall challenge is organized into three rounds of increasing complexity. This challenge is extremely difficult. Health care reform is one of the most intractable public policy and management problems in the United States. This project is organized in three rounds, with details in the RTH Policy Challenge document. The final deliverables are as follows:

P.1 Final Project Report;
P.2 Presentation (15 minutes);

5) Peer Evaluation (10%)
At the end of the course you will have the opportunity to evaluate your team-mates. This Peer Evaluation is confidential and will consider how well your team-mates prepared for the team tests and their overall contribution to the in-class exercises and out of class projects. For peer evaluation you each assign a total of N*10 points to the other N members of your team (for a team of N+1 people). Raters must differentiate some in their ratings (this means each rater would have to give at least one score of 11 or higher, with a maximum of 15, and at least one score of 9 or lower). As a result team peer evaluation will produce differences in grades only within teams. Consequently team members can't help everyone in their team get an A by giving them a high peer evaluation score. The only way for everyone in a team to earn an A is by doing an outstanding job on the individual and team tests and assignments.

6) Engagement and Participation (5%)
This course will be inherently challenging. Students who consistently demonstrate exceptional levels of engagement throughout the semester can earn up to an additional 5% onto the final grade.

Syllabus:

Class	Date	Topic	Reading/Preparation	Exercises/ assignments
1	Tuesday 1/27	Welcome and introduction to course, "Hopes and Fears", Overview of syllabus, Objectives, Expectations, Formats, and Examinations	Syllabus (On BB); Student academic Honesty Code available in the University Bulletin under " Academic policies and Procedures for All Students."	
2	Thursday 1/29	Overview of what are the overarching issues in health policy formation? What the health policy analysis is? Understand the current status of U.S. Health care in terms of costs, service levels, equity, access and resource inputs.	C&C Ch 1: Introduction C&C Ch 2 Where are we? Watch video: http://video.pbs.org/video/2198039 605/	
3	Tuesday 2/3	Overview of Constitutional issues in delivering health care; Alternative ways of structuring health care markets; Public preferences for health care change; inconsistencies from wearing multiple hats when reviewing health care choices;	C&C Ch. 3: How did we get there? C&C Ch 4: Where do we want to be?	
4	Thursday 2/5	Overview of system dynamics and the modeling process; introducing through an example of a concept model; decision making and learning; dynamic problems	Sterman Chap1: Learning in and about complex systems Sterman Chap2: system dynamics in action Sterman Chap 3:The modeling process	Workbook class 1
5	Tuesday 2/10	Maternal Health Game	Barnes-Josiah98- Three Delays (on BB)	
6	Thursday 2/12		C&C Ch 5: What are the Federal Governmental Alternatives? (pp.107-128)	Intro to ReThink Health/ Start Round 1 Assignment
7	Tuesday 2/17	Structure-behavior relationship; behavior modes; casual loop diagraming; operational thinking	Sterman Chap 4: Structure and behavior of dynamic systems Sterman Chap 5: Causal loop diagrams	Workbook class 2
8	Thursday 2/19		C&C Ch 5: What are the State and Local Government Alternatives?	

9	Tuesday 2/24		(pp. 128-143) Sterman Chap 6: Stocks and flows Sterman Chap 7: Dynamics of Stocks and flows	Workbook class 3
10	Thursday 2/26		C&C Ch 6: Alternative Responses & Initiatives of Institutions and Individuals	
11	Tuesday 3/3	Linking feedback with stock and flow structure; time constants, half-lives, and fractional rates; SIR models of spread of infectious disease; tipping points; modeling S-shaped growth	Sterman Chap 8 : Closing the loop Sterman Chap 9: Sections 9.1 and 9.2	Workbook class 4
12	Thursday 3/5		C&C Ch 7: The Policy Analysis Process-Identification and Definition	Round 1 Due.
13	Tuesday 3/10	Material and information delays	Sterman Chap 11: Delays	Workbook class 5
14	Thursday 3/12		Round 1 presentations	Class Works on Simulator
15	Tuesday 3/17	Coflows and aging chains	Sterman Chap 12: Coflows and aging chains	Workbook class 6
16	Thursday 3/19	Midterm		Midterm Exam
17	Tuesday 3/24	Pharmaceuticals: The innovation cycle; limits to growth	Sterman (2000)(pp. 323-346) C&C Ch 8: The Policy Analysis Process-Technology Assessment	(1)Pharmaceuticals Development and Pricing
18	Thursday 3/26	Population models; a simple population structure and model	Sterman (pp. 137-230; 469-485)	(2) One-stock Population model in equilibrium
19	Tuesday 3/31	Utilization: Introduction to NAMCS, NHAMCS, NHDS, ICD-9	Homer and Hirsch: System Dynamics Modeling for Public Health.pdf • http://www.cdc.gov/nchs/about/major/ahcd/ahcd1.htm • http://www.cdc.gov/nchs/about/major/hdasd/nhds.htm • http://www.cdc.gov/nchs/about/otheract/icd9/abticd9.htm	Round II Due Begin Planning Round III
20	Thursday 4/2, Tuesday 4/7, Thursday 4/9	Physician Office Visits: Structure and Model assignment No Class(Spring Break) No Class(Spring Break)	Sterman (pp. 716-720: 802-813) Vensim Modeling Guide Equilibrium Initialization	(3) Physician Visit Rate: Physician Visit Utilization Management Initiatives
21	Tuesday 4/14	Utilization management; Physician Office Visits sector: Structure review;	Homer et al. (2007) Chronic illness in a complex health economy National Hospital Ambulatory Medical Survey 2006	(4) Emergency Room Visit Rate; Emergency Room Visit Utilization Management Initiatives
22	Thursday	ER visits: Structure and	Mandelberg etal. (2000) Epidemiologic	

	4/16	Model assignment	Analysis of an Urban public Emergency Dept Freq Users	
23	Tuesday 4/21	ER Capacity: Structure and model assignment	Morgan (1996) Managed Care, Utilization Management, and Case Management in the Emergency Department Vensim TREND and FORECAST; Trend Molecule Sterman (2000) (pp. 807-810)	(5) ER Capacity
24	Thursday 4/23	ER visits and capacity review ;Sector review	Moskop et al. 2008) Emergency Department Crowding	
25	Tuesday 4/28	OP visits and capacity: Structure and model assignment	Rapid Spending Growth and Shift to physician offices indicate need for CMS to consider additional Management Practices http://www.gao.gov/new.items/d08452.pdf	(6) Outpatient Visit Rate; Outpatient Visit Utilization Management Initiatives; Outpatient Capacity
26	Thursday 4/30	IP visits, LOS and Capacity: Structure and model assignment	Kao and Tung (1980) Forecasting demands for impatient services in a large Public Health Care delivery Systems	(7) Impatient Visit Rate; Length of Stay; IP and LOS Utilization Management Initiatives; IP capacity
27	Tuesday 5/5	IP visits, LOS and Capacity: Sector review	Impatient Demand Management in UK-NHS Trust www.gloshospitals.org.uk/pdf/boardpapers/archive/2003/boardjune03/appforpara4.pdf	
28	Thursday 5/7	Overview of Results and Payer: Population, utilization, and who pays for what Leverage points Polarization of viewpoints and improvement in U.S. health care; tradeoffs associated with each proposal of changed policies and unintended consequences	C&C Ch 16: Conclusion- All Those Levers and No Fulcrum Donella Meadows (1999) Leverage Points: Places to Intervene in a System	Round III Peer Exercises
29	Tuesday 5/12	Final Presentations	None	

Thomas J. Watson School of Engineering and Applied Science Systems Science and Industrial Engineering

State University of New York at Binghamton

FALL 2015

SSIE 534 /ISE 434 - Fundamentals of Health Systems

CREDIT HOURS	**3**
INSTRUSTOR	Nasim Sabounchi, PhD (Sabounchi@binghamton.edu)
TEACHING ASSISTANT	TBA
OFFICE	Engineering Building - Room S11
CLASSROOM	Engineering Building, Room J23
TIME	Tuesdays 4:25 – 5:50 PM Thursdays 4:25 – 5:50 PM
GRADE	L/G
OFFICE HOURS	***Walk-In Time:*** Mondays 1:30 – 3 pm. Wednesdays 1:30 – 3 pm ***By Appointment:*** In addition to the above office hours, the instructor will see students at other time by appointment

I. COURSE DOMAIN AND LEARNING OBJECTIVES

The course introduces the student to the structure and functions of the U.S. Health Care System. The health care system in the community and its environment are examined to determine how they impact Health Services Administration. Topics to be covered include: overview of the U.S. Health Care System (private and public sectors), interface between Public Health and U.S. Health Care System, various health care delivery structures, health care workforce, health care resources, types of health services, financing of health services and health care coverage, meeting the health care needs of special populations, and critical issues in health services.

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

1. Define community, health, and health services administration.

2. Describe the historical development of the U.S. Health Care System.

3. Identify the major components of the U.S. Health Care System and discuss the way they interrelate to each other.

4. Examine and analyze the interface between Public Health and U.S. Health Care System.

5. Describe how socioeconomic, political, community health, and geographical location (i.e., rural) can affect the health care system.

6. Define and differentiate concepts of health, disease and illness, and analyze the morbidity and mortality risks for the U.S. population, and their impact on the U.S. Health Care System and Public Health.

7. Assess the health status at the national, state, county, and community levels using appropriate health indicators and data sources.

8. Examine the organization and systems framework of health services in the United States.

9. Explore cultural/geographical competencies and cultural/geographical relevant approaches in the delivery of health services to communities as related to African American, Asian American, Hispanic/Latino, and Native American Indian populations and to communities located in rural, tribal, and border areas.

10. Analyze problems and current issues related to health and health care in the United States and derive potential solutions.

11. Contrast the systems in the USA with another country or region

This course is a three credit, elective for graduate level and undergraduate senior students interested in expanding their frame of reference to include the administration, management, and leadership of organizations providing health services in a wide range of settings.

II. ACADEMIC POLICIES

Professional Conduct: All students are expected to practice and display a high level of personal and professional integrity. The policies of the Thomas J. Watson School of Engineering and Applied Science will be followed. Any minor unprofessional behavior to instructors, teaching assistants, or course assistants will result in reduction in overall grade per occurrence. Any major unprofessional behavior to instructors, teaching assistants, or course assistants will result in a failing grade and a hearing before the Watson School Academic Integrity Committee and could result in dismissal from the University.

Academic Honesty: We shall not tolerate lying, cheating, or stealing in any form. **All assignments (homework, projects, etc.) should reflect your own individual effort unless the instructor has specifically stated that the work is to be completed in teams.** Also, students will abide by Binghamton University's policy on academic honesty listed in the University Bulletin. Failure to abide by this policy may result in a zero grade in the assignment/exam/project or an F in the course, or may even have worse consequences, depending on the circumstances. The University guidelines will be strictly followed.

Absent Professor: Students will be notified in advance if the instructor is going to be late for class. However, if no arrangements have been made, and if an unscheduled conflict or emergency occurs which prevents the instructor (or someone else to cover for him) from meeting the class, the students are authorized to leave after waiting for 15 minutes.

Special Needs: If you have a learning disability, sensory, or physical disability or other impairment, and you may need special assistance in lectures, reading, written assignments, and/or exam taking, please contact Services for Students with Disabilities online at http://www.binghamton.edu/ssd/ or via Binghamton University, P.O. Box 6000, Binghamton, NY 13902-6000, office: UU-119, phone: 607-777-2686 (voice/TTY), fax 607-777-6893, or by e-mail ssd@binghamton.edu. This office can provide coordination of accommodations at Binghamton University. The Services for Students with Disabilities, a University-wide resource, provides diagnostic and academic accommodations support and referrals.

PROFESSIONAL USE OF TECHNOLOGY DURING CLASS: While note-taking on computers can be an appropriate learning tool, it can also detract from attention to class discussions and the quality of participation. The instructor retains the right to ask students to not use computers during portions of the class. At all times, students are encouraged to consider the impact of their in-class use of computers on the learning environment for themselves, their classmates and the instructor. Texting, checking e-mail or using the computer or internet for personal or non-class related purposes during class time is never appropriate and will be immediately addressed by the instructor.

English Language Proficiency: If your English language proficiency is such that you may need special assistance in lectures, reading, written assignments, and/or exam taking, please communicate these needs to your instructor, who may refer you to the English as a Second Language (ESL) program, online at http://www.binghamton.edu/esl/, which is a University-wide resource which provides classes and academic English language support designed to increase

non-native English speaking students' English language proficiency and to facilitate their academic success at Binghamton University. You may also find the Academic Assistance resources available through the Office of International Student and Scholar Services, online at http://www.binghamton.edu/isss/, to be helpful.

III. READINGS

Required Texts:

- Leiyu Shi & Douglas Singh (2015- Sixth Edition) **Delivering Health Care in America,** Jones and Bartlett Publishers.
- Supplemental articles will be provided by instructor, mostly through the blackboard.

Recommended Readings:

- Bodenheimer, T., & Grumbach, K. (2012). Understanding Health Policy: A Clinical Approach. (6th Edition). McGraw Hill.
- Johnson, J. A., and Stoskopf, C. H. (2010). Comparative Health Systems: Global Perspectives. Jones and Bartlett Publishers.
- Michaelsen LK, Sweet M. "The Essential Elements of Team-Based Learning." New Directions for Teaching and Learning, No.116. Winter 2008.

IV. ROLE OF FACULTY AND STUDENTS

Course Expectations: The **instructor** will: prepare and deliver course material; be available to students during office hours, after class, and by appointment for consultation; and provide timely and clearly explained feedback on student performance. The instructor expects **students** to be responsible for the material covered in class ***regardless of whether the student is in class or not***; complete all assignments in a timely manner; come to class prepared, having read all assignments; participate in class discussions; participate in team meetings outside of class; seek any necessary clarification regarding course expectations and assignments from the instructors; provide the instructors with feedback about the effectiveness of the course; and, take an active role in shaping a positive course experience. **Any problems with meeting deadlines or completing assignments should be discussed promptly with the instructors**.

V. STUDENT ORIENTATION TO TEAM-BASED LEARNING

This course (**SSIE 534 /ISE 434**) is organized based on the principals of Team-Based-Learning (TBL). Using TBL allows for greater involvement of students in the learning process through multiple hands-on exercises on each topic and team-based problem solving. In fact the majority of class time will be spent on using the concepts of the course for solving practical problems. The positive things about this approach include reduction in homework, greater participation during the class, more active learning, and provision of faster feedback. TBL requires students to:

1) Do the reading assignments seriously. In fact the class time is typically not spent on repeating what you can read in the text.
2) Actively participate in classroom discussions and team activities.

In this course, you will acquire your initial exposure to the content through readings and will be held accountable for this preparation using a testing process known as the Readiness Assurance Process. Following the Readiness Assurance Process, you will practice applying the course concepts using a series of in-class team application exercises.

Readings

Each module of the course will begin with readings that you must complete before the first class session of each module. See the syllabus for the guide to the readings and the schedule of activities. Most modules consist of one chapter of the text book. You'll be held accountable for the reading preparation through a Readiness Assurance Process. This will ensure that you understand the core concepts and are ready to work on applying the concepts.

Readiness Assurance Test

At the first session of each module you will complete the Readiness Assurance Test (RAT). The RAT includes a short multiple choice test that you take first as an individual and then again as a team, followed up by a larger class discussion and an opportunity to ask the instructor questions. The RATs are closed-book and you are not allowed to use previous versions of the test (if any) to prepare for them. Binghamton University Student Academic Honesty Code is in effect for all these tests and the grading procedure. Please make sure you are aware of the honor code system by visiting the University Bulletin under "Academic Policies and Procedures for All Students (https://bulletin.binghamton.edu)

- **I-RAT** - This process begins with a 15-20 question, multiple choice test that is taken individually (I-RAT). This test is used to assess your comprehension of the assigned readings. Print and bring RAT answer sheets with yourself to the class (posted on the Blackboard) and use them for I-RAT and T-RAT (below). After each I-RAT you will hand in your answer sheet to another individual in the class who will grade your test sheet after the T-RAT is completed based on the answer key provided by the instructor. Hand in your answer sheet to a different reviewer each time, preferably to somebody outside of your team. That individual is responsible for filling out the online RAT evaluation survey for reporting your grade. The answer sheets are collected at the end of the session and sent to instructor for random checking of accuracy of test result reports. When you are reviewing a RAT, make sure you note down the following information because you will not have the answer sheet when filling out the survey (it is already submitted to instructor):
    - Individual/Team Full Name
    - RAT Number (which will be indicated at the beginning of the RAT and in the syllabus)
    - Number of questions and the number of correct answers in the multiple choice questions

  When you hand in your I-RAT answer sheet to another student for review/grading, make sure you write down the name of the reviewer and the RAT number, in case of future discrepancies (e.g. a reviewer forgetting to submit your grade).

- **T-RAT** - Following the I-RAT, the same multiple choice test is re-taken as a team (T-RAT). You will discuss what you think is the best answer and reply to the tests as a team. At the end of the T-RAT we will go through the answers in the class. During this time you will grade another individual's I-RAT while yours is being graded by somebody else. The T-RATs are graded by one of the members of your team. Decide amongst yourselves who will grade your team's answer sheet. Again, make sure you record the grading information because the answer sheets will be collected and sent to the instructor at the end of each session.
- **Reporting RAT Grades**- If you have graded an I-RAT or T-RAT, you should report the results through the following online survey before the next session. Make sure you keep the record of the RATs you have assessed and fill out the online survey. You will lose the grade for a RAT if you forget to input the grades of the individual/team you have graded.
- **Appeals** - Once the team test is completed your team will have an opportunity to fill out an appeals form for questions where you disagree with the question, the answer, or the readings. Appeals are only for T-RATs. Your team E-mails the completed form. Appeals should be submitted within the week following a RAT. Instructor will review the appeals outside the class time and will try to report the outcome of your team's appeal by the next class meeting. Make sure you follow the instructions for appeals that is posted on the blackboard.
- **Feedback and Mini-lecture** - Following the tests and appeals the instructor will answer any further questions on the reading material. Come prepared so that if you have any problems or need clarification on any of the points you can ask your questions at this point.

Application Exercises

Following the Readiness Assurance Process, the bulk of class time will be used to work on exercises that require you and your team to apply course concepts. These exercises focus on your judgment and the ability to apply your knowledge rather than simply recalling the information. Class exercises are often followed by a discussion of answers.

One or two of application exercise in each class will usually be more comprehensive. At the end of that exercise a few of the teams (usually 2-3) are randomly selected to quickly (in 3-5 min) present their answer to the exercise. Teams will be notified beforehand if an exercise will include presentation and grading. Random selection will exclude teams that have already presented on that exercise as well as those teams that have presented two times more than the team with minimum number of previous presentations. Therefore over the semester we will have roughly the same number of presentations from different teams. You are encouraged to put together a power-point or other electronic files for your presentation, you should E-mail it to the instructor (Sabounchi@binghamton.edu) before the first presentation starts. You need to rotate the individual who presents the solution of your team to an exercise, so everybody should have presented once, before somebody can present a second time.

These presentations will be evaluated by all of the students and the instructor and will count as part of the team's performance. Use the following survey to evaluate the quality of the

presentations in the class. You can only evaluate other team's presentations. A reminder announcement will be posted on the blackboard for evaluating team presentations.

Some exercises are graded by the instructor even though no presentation is made in the class. You will know about those exercises being graded as well.

Peer Evaluation

At the end of the course you will have the opportunity to evaluate your team-mates. This Peer Evaluation is confidential and will consider how well your team-mates prepared for the team tests and their overall contribution to the in-class exercises and out of class projects. For peer evaluation you each assign a total of N*10 points to the other N members of your team (for a team of N+1 people). Raters must differentiate some in their ratings (this means each rater would have to give at least one score of 11 or higher, with a maximum of 15, and at least one score of 9 or lower). As a result team peer evaluation will produce differences in grades only within teams. Consequently team members can't help everyone in their team get an A by giving them a high peer evaluation score. The only way for everyone in a team to earn an A is by doing an outstanding job on the individual and team tests and assignments.

VI. GRADING CRITERIA

The final grade will be determined by the following percentage distribution:

Assignment	Percentage of final grade
Individual Readiness Assurance Test	15
Team Readiness Assurance Test	20
Team Presentations and Class Exercises	20
Final Team Project	25
Instructor Review of Individual Participation	10
Peer Review of Team-member Participation	10
Total	100%

Final Grade Scale:

A (100-97) A- (96-93) B+ (92-89) B (88-85) B- (84-80) C+ (79-78) C (77-74) C- (73-70) F (69 and below).

VII. COURSE OUTLINE

Make sure you review the updated syllabus before starting with the weekly readings. In general it is better to stay ahead of the readings so that you distribute them evenly between alternate weeks.

The following course outline provides a list of topics, readings, and exercises and assignments for each class of the semester. Readings with a bullet (•) are required of all while readings with a plus (+) sign are optional.

Reading Guidelines:

- S&S Ch. 2 = Read Chapter 2 of "(2015- Sixth Edition) **Delivering Health Care in America**" by Leiyu Shi & Douglas Singh.
- BB = The reading material is available from blackboard.
- TBA: Other Reference Materials (To Be Assigned) Instructor will make supplemental reading assignments. These reference materials will include current articles, books and web site materials.

RAT

Readiness Assurance Test (RAT) includes multiple choice tests on the content of the readings assigned for each session. Both individual and team level RATs will be conducted at the beginning of (approximately) every other session. See the guide for TBL for more information. Enter the grades for RATs you have graded at the survey link on blackboard.

Team Exercises

The majority of class time is spent on team-based exercise based on the material you have covered in your readings. Some of these exercises are graded as part of the course grading system. Many of them are not. Some of these exercises are presented in the class and partly graded by the other teams through students filling the following survey after the presentation. The student evaluations will be averaged after excluding the two evaluations that have reported the highest and the lowest grades (to avoid extreme opinions determining the results), and will then be combined with instructor evaluation to provide team grades on specific presentations at the survey link on blackboard.

Team Project: Overview of a foreign healthcare system.

This project will allow you to apply what you learn in this course to the (comparative) analysis of health care system in a country or region of the team's interest. You are also expected to conduct an in-depth comparison between 1-4 aspects of this health system and those of the U.S. healthcare system. The deliverables are as follows:

- P.1 A list of 3-4 countries and regions that the team is most interested in, with a short description of why each country/region is of interest;
- P.2 A list of references you are planning to use for the project;
- P.3 Final Project Report;
- P.4 Presentation (15 minutes);
- P.5 Peer evaluation form.

Class	Date	Topic	Reading/Preparation	Exercises/ assignments
1	Tuesday 9/1	Welcome and introduction to course, Overview of syllabus; objectives; expectations; formats; and examinations; Team Selection; readiness-assurance Process	Syllabus(On BB); Student academic Honesty Code available in the University Bulletin under " Academic policies and Procedures for All Students." Michaelsen & Sweet 08 (on BB)	RAT 0
2	Thursday 9/3	Overview of system dynamics and the modeling process; decision making and learning; dynamic problems	Sterman Chap 1: Learning in and about complex systems (on BB) Sterman Chap 2: System dynamics in action (on BB)	Class Exercise 0
3	Tuesday 9/8	Discussion of health services and the healthcare delivery systems (HCDS) Discussion of health services, administration regulatory overview discussion of management functions	S&S Ch1:Overview of US Health Care Delivery Watch Video: http://video.pbs.org/video/2198039605/	RAT 1
4	Thursday 9/10		Class Exercise 1: Based on http://video.pbs.org/video/2198039605/	
5	Tuesday 9/15	No Class(Rosh Hashanah)		
6	Thursday 9/17	Review Beliefs; Values and Health	S&S Ch 2: Beliefs, Values & Health	RAT 2
7	Tuesday 9/22	No Class(Yom Kippur)		
8	Thursday 9/24	Structure-behavior relationship, Behavior modes; casual loop diagraming; operational thinking	Sterman Chap 4: Structure and behavior of dynamic systems (on BB) Sterman Chap5 :Causal loop diagrams (on BB)	
9	Tuesday 9/29	Discuss evolution of health services in the US	S&S Ch 3: The Evolution of Health Services in US	RAT 3
10	Thursday 10/1	Maternal Health game	Class Exercise 2: Based on Barnes-Josiah98- Three Delays (on BB)	
11	Tuesday 10/6	Review health services professionals	S&S Ch 4: Health Services Professionals	RAT 4
12	Thursday 10/8		Class Exercise 3	
13	Tuesday 10/13	Review Medical Technology	S&S Ch 5: Medical Technology Case Study 3	RAT 5
14	Thursday 10/15		Class Exercise 4	
15	Tuesday 10/20	Discuss role and scope of health services financing Discuss the role of government and National health expenditures	S&S Ch 6: Health Services Financing	RAT 6
16	Thursday 10/22		Class exercise 5	Team Project (P1)
17	Tuesday 10/27	Review and discuss System Processes Discuss outpatient and primary	S&S Ch 7: Outpatient and Primary Care Services	RAT 7

		care and the management implications Consider ambulatory care, home healthcare, and neighborhood health centers		
18	Thursday 10/29		Class Exercise 6	
19	Tuesday 11/3	Review impatient facilities and services Hospitals, recognitions, ethical and legal issues in patient	S&S Ch 8: Inpatient Facilities and Services	RAT 8
20	Thursday 11/5		Class Exercise 7	Team Project (P2)
21	Tuesday 11/10	Discuss the beginning of the managed care era Discuss provider response strategies and implications for management Discuss consumer responses to managed care and implications for providers	S&S Ch 9: Managed Care and Integrated Organizations	RAT 9
22	Thursday 11/12		Class Exercise 8	
23	Tuesday 11/17	Discuss chapters#10, long term care, implications, needs and future trends	S&S Ch 10: Long-Term Care	RAT 10
24	Thursday 11/19		Class Exercise 9	
25	Tuesday 11/24	Discuss chapter#11 Health services for special populations, needs, trends, and future impact on the HCD.	S&S Ch 11: Health Services for Special Populations	RAT 11
26	Thursday 11/26	No class (Thanksgiving)		
27	Tuesday 12/1		Class Exercise 10	
28	Thursday 12/3	Discuss of finances and the impact on health policy development and implications for health administrators	S&S Ch 12: Cost, Access, and Quality	RAT 12
29	Tuesday 12/8		Class Exercise 11	
30	Thursday 12/10	Impact the current events may have on healthcare policy creation	S&S Ch 13: Health Policy	RAT 13
31	Tuesday 12/15		Class Exercise 12: Rethink Health	
32	Thursday 12/18	Presentations (P4)	None	
33	Tuesday 12/22	Presentations (P4)	None	Team Project (P3) and (P5) due

SSIE 537 (ISE 437) Industrial & Systems Engineering in Healthcare Spring 2014

T 4:25-7:25pm, EB J23

Instructor: Dr. Mohammad T. Khasawneh, Ph.D., Professor Email: mkhasawn@binghamton.edu
Office: EB K2, (607) 777-4408
Office Hours: T 2:00-4:00pm & by appointment

Teaching Assistant: Tamara Alibrahim (talibra1@binghamton.edu)
Office Location & Hours: EB T12, T/R 12:30-2:30pm & by appointment

Prerequisites: Graduate standing in the department or permission of the instructor.

Textbooks: Daniel B. McLaughlin and John R. Olson (2012). Healthcare Operations Management, Health Administration Press, Second Edition (ISBN 13: 978-1- 56793-444-1). (*Required*)

Reid, P.R., Compton, W.D., Grossman, J.H. (Book Editors) (2005). *Building a Better Delivery System: A New Engineering/Health Care Partnership*, The National Academy Press, Washington, D.C. (ISBN-10: 0-309-09643-X). (*Recommended*)

Leiyu Shi (2008). *Delivering Health Care in America: A Systems Approach*, 4th Edition, Jones and Bartlett Publishers, Sudbury, MA (ISBN-10: 076374512X). (*Recommended*)

Course Description: The application of industrial and systems engineering principles to continuous process improvement in the health care domain will be studied. Concepts that will be addressed will include, but not be limited to, process mapping, optimization, scheduling, lean and flexible systems, quality enhancement, simulation, supply chain management, inventory control, and information management.

Course Outline: (Outline/sequence is preliminary in nature and is subject to change)

- Introduction Healthcare
  - A Distinctive System of Healthcare Delivery
  - Healthcare as a Business
- System Resources, Processes, and Outcomes
- A New Partnership: Systems Engineering and Healthcare A
  - Systems Approach to Healthcare Delivery
  - Industrial/Systems Engineering Tools (Design, Analysis, Control)
- Process Engineering and Optimization
  - Patient and Process Flows
  - Quality Management and Strategies for Process Re-design
  - Planning for Operational Excellence
  - Project and Change Management
  - Productivity Measurement and Performance Management
  - Queuing Theory, Waiting Line Analysis, and Simulation

Process Simulation and Predictive Modeling
Strategic/Tactical Application of Six Sigma Concepts
Healthcare Lean Enterprise Theory
Return on Investment Models

Logistics and Supply Chain Management (Strategy, Purchasing, Inventory)
Human Factors/Ergonomics in Healthcare
Scheduling and Capacity Management
Special Topics: Telemedicine and Clinical Informatics, Healthcare Finance, Healthcare Policy & Decision Making, Emerging Technologies, Visionary Perspectives: Healthcare's Future

Policies & Guidelines:

Q Evaluation:

- Grading

Homework/Quizzes	20%
Research Paper(s)/Presentations	20%
Project(s)	20%
Midterm	20%
Final Exam	20%

- Grades will be assigned on a ten-point scale (e.g., 70-79: C). Points totals towards the upper limits of the ranges will receive +'s, while point totals near the lower limits of the ranges will receive –'s.

- Exam Schedule Midterm – Tuesday, March 11, 2014 (tentative)
  Final Exam – Tuesday, May 13, 2014 (firm)

- Assignments

Homework assignments will be assigned from time to time. Students are required to show all their work (computer and/or manual). Computer printouts and/or manual homework problems must be originals when turned in as your homework. Assignments will be accepted on the day they are due and "in-class" only, unless otherwise instructed. ***Late Penalty is 20% per day (including weekends).*** All assignment reports should be written based on the instructions provided. **Please provide a cover page for all your assignments. Quizzes will not be announced**.

- Missed Tests

The student is expected to notify the instructor in advance in the event an emergency occurs which prevents the student from taking an exam at the scheduled time, if possible. Make-up exams will only be given for absence due to ***unavoidable*** situations. Subsequently, the student is required to present a written explanation. If the explanation is not satisfactory, then a make-up exam ***may be*** administered with a substantial penalty (usually up to 50% or even more), or a grade of zero may be assigned, depending on the circumstances.

Q Attendance:

The student is responsible for all of the information presented, materials distributed, and announcements made in class.

Q Email:

Students are responsible for all E-mail messages sent by the instructor. It is the student's responsibility to make sure his/her Binghamton University's email address is working. It is our official way of communicating with you.

Q Reading Assignment:

Students are strongly encouraged to read the chapters before the lecture period to facilitate understanding and discussions during the lectures.

Q Academic Honesty:

We shall not tolerate lying, cheating, or stealing in any form. **All assignments (homework, papers, projects, presentations, etc.) should reflect your own individual effort unless the instructor has specifically stated that the work is to be completed in teams**. Students will abide by Binghamton University's policy on academic honesty listed in the University Bulletin. Failure to abide by this policy may result in a zero grade in the assignment/exam/project or an F in the course, or may even have worse consequences, depending on the circumstances. The University guidelines will be strictly followed.

Q Absent Professor:

Students will be notified in advance if the instructor is going to be late for class. However, if no arrangements have been made, and if an unscheduled conflict or emergency occurs which prevents the instructor (or someone else to cover the lecture) from meeting the class, the students are authorized to leave after waiting for 15 minutes.

Q Miscellaneous:

- Please silence or turn off your cell phones (and all other electronic devices – **iPads**, **Palms, Pocket-PC's, iPods, iPhones, pagers, etc.**) before coming to class. Disturbance of class by electronic devices will result in a reduction of your score on the next scheduled exam or assignment (5 pts. each occurrence). *All laptops should be closed during lecture unless instructed otherwise*. Finally, the use of earphones is not allowed during classes.
- If you are a student with special needs, please contact me as soon as possible.

SSIE 538 Healthcare Finance and Accounting

Purpose: The purpose of this course is to familiarize the concepts of costing procedures, budgeting, and modeling of investment procedures in health systems.

Instructor: Nagen Nagarur
Ph: 607-777-3027
Email: nnagarur@binghamton.edu
Office Hours: Wednesdays, 8:00 pm – 9:00 pm

Teaching Assistant: Lubna Al-Nasser
Email: lalnass1@binghamton.edu
Office Hours: Tuesdays, 8:00 pm – 9:00 pm

Syllabus:

- Introduction to Cost Accounting
- Cost Definitions
- Product Costing
- Cost Allocation
- Costing for Non-routine Decisions
- Cost-Volume Profit Analysis
- Accounting Entry Processes
- Balance Sheet, Income Statement, and Cash Flow Statements
- Engineering Economy, Time Value of money, Project selection
- Financing for Healthcare Organizations
- Budgeting
- Cost Accounting Ratios
- Measuring Productivity
- Activity Based Costing

Resources for material:

Text book: Essentials of Cost Accounting for Healthcare Organizations, Third Ed., Finker, S.A., Ward, D.M., and Baker, J.J., Jones and Bartlett Publishers, 2007.
Other supplemental materials provided.

Grading:

Home work: 30%
Classwork: 20%
Mid Term: 25%
Final: 25%

Mid Term Examination will be in-class. Final Exam will be a take home, given at the end of the last class, to be submitted the following Friday.

SSIE 539/ISE 439 Human Factors Engineering in Healthcare
Spring 2015

Course Information

Time: Tuesdays and Thursdays 2:50-4:15pm
Location: EB J23
Credits: 3

Instructor: Huiyang Li
Office: EB S-04 Email: hli@binghamton.edu
Office hours: Tuesdays and Thursdays 4:15-5:30pm or by appointment

Teaching Assistant: Tamara Alibrahim
Office: EB T16 Email: talibra1@binghamton.edu
Office hours: Tuesdays and Thursdays 11:30am-12:30pm or by appointment

Course Description

This course introduces and emphasizes the role that human factors engineering (with a focus on cognitive ergonomics) plays in healthcare systems, and its applications to help improve quality, safety, efficiency, and effectiveness of patient care. Cognitive Ergonomics is concerned with supporting decision-making and problem-solving in complex domains through the design of user-centered technologies and representations. The course will analyze how artifacts, social interactions, and factors such as time pressure, competing demands, and uncertainty affect perceptual and cognitive performance in joint human-machine systems. Interface design techniques as well as research and evaluation methods will be presented. In addition to cognitive ergonomics, concepts in macroergonomics and their applications will be introduced. Examples of on-going human factors and ergonomics research in health care will be discussed. Focused topics include human factors in workflow models; work system design for patient safety; human error analysis/taxonomies to reduce medical errors; task analysis and data collection methods in healthcare environments; clinical staff workload and patient safety; physical ergonomics in healthcare and human performance modeling; and diffusion and adoption of technology in healthcare, with emphasis on the usability and design of medical devices and information systems.
Prerequisite: no required courses, but knowledge in human factors and ergonomics will be helpful.

Learning objectives

At the end of the course, the students should be able to

- understand concepts in human factors and cognitive ergonomics,
- use human factors principles in the design of human-machine systems,
- understand human factors methods (cognitive task analysis, usability testing, simulation studies, and ethnographic studies) and use these methods in design and evaluation,
- understand human factors challenges in specific health care settings,
- communicate the procedure and outcomes of design and evaluation projects.

Textbooks and readings

Textbooks*
Wickens, C. D., Lee, J., & Liu, Y. and Gordon-Becker, S. (2003). Introduction to Human Factors Engineering. 2nd Edition. Pearson.

Carayon, P. (Ed.) (2012). Handbook of Human Factors and Ergonomics in Health Care and Patient Safety. 2nd Edition. CRC Press.
Weinger, M. B., Wiklund, M. E., & Gardner-Bonneau, D. J. (2010). Handbook of Human Factors in Medical Device Design. CRC Press.
*A desk copy of the first two books is reserved at the Newcomb Reading Room; the third book is available online through the university library.

Readings:
Books, book chapters, articles: see references for details. New items will be added through the semester.

Related courses on campus

1. SSIE 537/ISE 437 – Industrial and Systems Engineering in Healthcare
2. SSIE 534/ISE 434 – Fundamentals of Health Systems
3. NURS 532 – Health Care Delivery System
4. SSIE 530X – Health Care Policy Analysis
5. NURS 634 Health Policy
6. SSIE 637 – Advanced Topics in Healthcare Systems
7. SSIE 538x – Financial Management in Healthcare Systems (in preparation)
8. SSIE 6/5xx – Cognitive Ergonomics (under development)
9. SSIE 6/5xx – Research Methods in Human Factors (under development)
10. NURS 615 Information Systems & Technology in Health Care
11. Courses in the Psychology Department and Management School regarding human cognition and organizational behavior

Topics

Human Information Processing and Human-Centered Design

Human-Centered Design (Shneiderman, 1998 (section 2.5); Woods and Roth, 1988 - pp. 3-26 (to end of section 1.5))
Rasmussen's Skill-Rule-Knowledge Framework (Rasmussen, 1983) Ecological
Interface Design – Basic Concept and Examples (Vicente, 2002) Human-
Information Processing (Wickens et al. 2004, Chapter 6)
Bridging the Gulf of Execution: Natural Mappings, DMIs, and other techniques (Norman, 1993; Wickens et al., 2004 – Chapter 8)
Bridging the Gulf of Evaluation: Representation Aiding (Norman, 1993; Woods, 1995)
Multimodal Interfaces (Sarter, 2006; Wickens, 2008)

Methods in Human Factors and Ergonomics

Cognitive Task Analysis (Wickens et al., 2004 --- chapter 3); Usability Testing; Ethnographic Studies of Cognition (Hughes et al., 1992)
Experiments and Simulation Studies (Wickens et al., 2004 – chapter 2; Ferris & Sarter, 2011)
Digital Human Modeling

Human Error

Human Error or Human-Machine Mismatches (Reason, 1990 - chapter 3) Error and Disturbance Management

Collaboration With and Through Machines

Function Allocation, Cooperative Problem-Solving, and Distributed Cognition (Hutchins, 1995; Salas et al., 2008)
Computer-Supported Collaborative Work (Olson and Olson, 1999)
Human – Automation (Technology) Interaction (Bainbridge, 1983; Wickens et al., 2004 --- chapter 16)

Decision Making and Decision Support
Classical Decision Theory and Naturalistic Decision Making (Klein, 2008; Wickens et al., 2004 --- chapter 7) "What Is Good Advice?": The Design of Intelligent Decision Support Systems (Mosier, 1997)

Organizational and Social Factors
Social factors (Wickens et al. 2004, Chapter 19);
High Reliability Theory and Mindfulness in High Reliability Organizations (Weick et al., 1999)
Resilience Engineering (Woods, 2003)
Hanndoffs and Transitions of Care (Carayon (ed.) 2012, Chapter 11)

Physical Ergonomics Overview
Biomechanics (Wickens, et al., 2004, Chapter 11) Hand Tool Design
Engineering Anthropometry and Workspace Design (Wickens, et al. 2004, Chapter 10)

Human Factors and Ergonomics in Specific Healthcare Settings
Human Factors Standard in Medical Device Design (Weinger et al., 2010)
Human Factors Consideration in Health IT Design and Development (Carayon (ed.) 2012, Chapter 38)
Human Factors and Ergonomics in Intensive Care Units (Carayon (ed.) 2012, Chapter 40)
Human Factors and Ergonomics in the Emergency Room (Carayon (ed.) 2012, Chapter41)
Human Factors and Ergonomics in Home Care (Carayon (ed.) 2012, Chapter 43)
Human Factors and Ergonomics in Primary Care (Carayon (ed.) 2012, Chapter44)

Assignments
All assignments (except the Word Press Blog postings) should be submitted to Blackboard.

Readings
There will be 1-3 assigned readings (book chapters or journal articles) for each lecture. Readings underscored are required. Each student will submit at least one insightful question/comment about the reading. The question is due two days (at 8pm) prior to the lecture time. Pop quizzes regarding the readings may be given without prior notice.

Word Press Blog:
Each student will post one blog every week about a reading (excluding the required reading assignment) on the class blog. The reading can be a journal article, a conference paper, an article in the newspaper, or an audio/video clip etc. Student should write a brief blog (100-200 words) about the article, and post the link to the article.

Presentation of an academic paper:
Each student selects a lecture in which s/he will make a 12-minute presentation (including Q&A) of a journal article or a conference proceedings paper. The paper should be relevant to the topic of the lecture and should be in the healthcare domain. Students are expected to finish the readings of that lecture and discuss the selection of the paper with the instructor at least 1 week before the presentation. Research papers are preferred over review papers.

Term Project:
Student will work as individual or in team of two on a research project. The project can be an empirical study (including experiments, observations, interviews, surveys, usability testing, etc.), a thorough and in-depth redesign proposal, or a modeling project (e.g. using Jack software). Deliverables:

1.1 A list of three or four topics (with rank) that the student/team is interested in working on;
1.2 A literature review and a research plan;
1.3 Presentation;
1.4 Final Report (should be a near-publishable journal article or proceedings paper, following the format

of the targeted journal or proceedings);
1.5 Peer evaluation form (for team work only).

Small assignments
Students will be asked to submit small assignments occasionally, e.g. submit a photo/headshot, submit a mid-term course evaluation/feedback.

Late Policy
Submissions within 1 hour of the deadline will result in 10% penalty; submissions after 1 hour but within 24 hours will result in 20% penalty. Late submissions after 24 hours of due time will not be accepted.

Exam
There will be a midterm exam that probes your knowledge and understanding of technical terms, basic concepts and research methods in human factors and its applications in healthcare, as well as your ability to apply those ideas the design and evaluation of systems and interfaces.

Make-up exams: Make-up exams will be offered only in case of sickness, military service, jury duty, presentation at a professional conference, or death in the family. In all of these cases, some form of documentation will be required. Make-up exams may be in a different format (e.g. oral exam).

Attendance and Participation
Class attendance is required. Attendance will be checked on random dates. In addition, students will receive 0 points on missing pop-quizzes due to absence.
Students are expected to actively participate in discussion. Your contributions to class discussions will be considered in the determination of your final grade.

Grading
Reading assignments – question/comment (5%) Class blog (10%)
Mid-term exam (25%)
Presentation of a journal article (8%) Project:

- List of 3-4 topics (2%)
- Literature review and research plan (5%)
- Report: (30%)
- Presentation: (10%)

Miscellaneous (5%, including pop-quizzes, attendance, participation, small assignments, etc.)

Classroom rules
Use of mobile electronic devices, including but not limited to laptop computers, tablets, cell phones, is prohibited in class unless noted otherwise.
Please sit close to the instructor (center seats in the front rows). No sitting in the back (two) rows. Food and drinks are not allowed in EngiNet classrooms.

Communication
Students are responsible for all oral and written communications made in class or through E-mail messages sent by the instructor and TA. The student is responsible for all of the information presented, materials distributed, and announcements made in class. It is the student's responsibility to make sure his/her Binghamton University's email address is working properly (be able to receive email messages and announcements sent through Blackboard). Bmail is our official way of communicating with you outside of class.

Accommodations

Please inform the instructor in the first three weeks of the semester, if you require special accommodations due to learning disabilities, religious practices, physical disabilities, medical needs, or other special circumstances. Here is a link to Services for Students with Disability http://www2.binghamton.edu/ssd/

Academic Honesty

Please make sure that you review the Academic Honesty Code (http://provost.binghamton.edu/honesty.html). Violators of the code should expect to FAIL this class.

References and Resources

Bainbridge, L. (1983). Ironies of automation. Automatica, 19, 775-779.

Ferris, T. and Sarter, N. (2011). Continuously-informing vibrotactile displays in support of attention management and multitasking in Anesthesiology. Human Factors, 53(6), 600-611.

Hutchins, E. (1995b). How a cockpit remembers its speeds. Cognitive Science, 19, 265-288. Klein, G. (2008). Naturalistic Decision Making. Human Factors, 50(3), 456-460.

Norman, D.A. (1993). Things that make us smart (Chapter 3 –The Power of Representation). Reading, MA: Perseus Books.

Mosier, K. (1997). Myths of expert decision making and automated decision aids. In C.E. Zsambok and G. Klein (Eds.), Naturalistic decision making (pp. 319-330). Mahwah, NJ: Lawrence Erlbaum Associates.

Carayon, P. (Ed.) (2012). Handbook of Human Factors and Ergonomics in Health Care and Patient Safety.
2nd Edition. CRC Press.

Rasmussen, J. (1983). Skills, rules, and knowledge; signals, signs, and symbols, and other distinctions in human performance models. IEEE Transactions on Systems, Man, and Cybernetics, 13, 257-266.

Reason, J. (1990). Human error (Chapters 3). New York: Cambridge University Press.

Salas, E., Cooke, N.J., and Rosen, M.A. (2008). On Teams, Teamwork, and Team Performance: Discoveries and Developments. Human Factors, 50(3), 540-547.

Shi, L., & Singh, D. A. (2015). Delivering Health Care in America: A Systems Approach. Burlington, MA: Jones & Bartlett Learning.

Shneiderman, B. (1998). Designing the User Interface: Strategies for Effective Human-Computer Interaction. Reading, MA: Addison-Wesley.

Vicente, K. (2002). Ecological Interface Design: Progress and Challenges. Human Factors, 44(1), 62-78.

Weick, K.E., Sutcliffe, K.M., and Obstfeld, D. (1999). Organizing for high reliability. In Research in Organizational Behavior, 21, 81-123.

Wickens, C.D. (2008). Multiple Resources and Mental Workload. Human Factors, 50(3), 449-455.

Wickens, C.D., Lee, J., Liu, Y., and Gordon Becker, S. (2004). An Introduction to Human Factors Engineering (2nd edition; chapters 2, 3, 7, 8, 16 and 19). Upper Saddle River, NJ: Prentice Hall.

Wickens, C.D. (2008). Multiple Resources and Mental Workload. Human Factors, 50(3), 449-455.

Weinger, M. B., Wiklund, M. E., & Gardner-Bonneau, D. J. (2010). Handbook of Human Factors in Medical Device Design. CRC Press.

Woods, D.D. (1995). The alarm problem and directed attention in dynamic fault management. Ergonomics, 38(11), 2371-2393.

Woods, D.D. (2003). Creating foresight: How resilience engineering can transform NASA's approach to risky decision making.

Woods, D.D. and Roth, E.M. (1988). Cognitive Systems Engineering. In M. Helander (ed.), Handbook of Human-Computer Interaction (pp. 3-43). Elsevier.

http://hfes.org http://www.ncbi.nlm.nih.gov/pubmed
http://jama.jamanetwork.com/journal.aspx
http://jamia.bmj.com/ http://www.ahrq.gov/

Tentative Schedule

Date	Day	Topic	Readings	Deadline
1/27	T	Course overview		
1/29	R	Overview of US Health Care Systems	List of terms Shi & Singh, Ch 4, 7, 8, 10	
2/3	T	Human-Centered Design	Shneiderman, 1998 (section 2.5); Wickens et al., Ch 8, 9	
2/5	R	Rasmussen's Skill-Rule-Knowledge Framework Ecological Interface Design – Basic Concept and Examples	Rasmussen, 1983; Vicente, 2002	
2/10	T	Research Methods I: Cognitive Task Analysis; Usability Testing; Ethnographic Studies of Cognition	Wickens et al., 2004 - - - Ch 3; Hughes et al., 1992	1.1
2/12	R	Research Methods II: Simulation Studies	Wickens et al., 2004 – Ch 2; Ferris & Sarter, 2011; Ha, Cao & Khasawneh, 2014	
2/17	T	Human Information Processing and Interface Design I	Norman, 1993; Wickens et al., 2004 – Ch 8; Woods, 1995	
2/19	R	Human Information Processing and Interface Design II	Sarter, 2006; Wickens, 2008	
2/24	T	Guest lecture		
2/26	R			
3/3	T			
3/5	R	Human – Automation (Technology) Interaction	Bainbridge, 1983; Wickens et al., 2004 -- Ch 16	
3/10	T	Human – Automation (Technology) Interaction	Bainbridge, 1983; Wickens et al., 2004 -- Ch 16	
3/12	R	Human Error and Error Management	Reason, 1990 - - - Ch 3	
3/17	T	Concept map exercise		
3/19	R	Midterm-review		
3/24	T	Midterm exam		
3/26	R	Decision Making and Decision Support	Wickens et al., 2004 - - - Ch 7; Klein, 2008; Mosier, 1997	
3/31	T	Function Allocation, Cooperative Problem-Solving, and Distributed Cognition; Computer-Supported Collaborative Work	Hutchins, 1995; Salas et al., 2008; Olson and Olson, 1999	
4/2	R	Physical Ergonomics, Human Factors (Standards) in Medical Device Design	Wickens et al., 2004, Ch 10-13; Weinger et al., 2010, Ch 4, 12, 15; ANSI/AAMI HE75	
4/7	T	No class (spring recess)		
4/9	R	No class (spring recess)		
4/14	T	Social factors; Safety culture: High Reliability Theory; Resilience Engineering	Wickens et al., 2004, Ch 19; Weick et al., 1999;	
		Hanndoffs and Transitions of Care	Woods, 2003; Carayon (ed.) 2012, Ch 11	

4/16	R	Human Factors Consideration in Health IT Design and Development	Carayon (ed.) 2012, Chapter 38	
4/21	T	Human Factors and Ergonomics in Intensive Care Units and the Emergency Room	Carayon (ed.) 2012, Chapter 40, 41 (pick one to summarize)	
4/23	R	Human Factors and Ergonomics in Primary Care and Home Care	Carayon (ed.) 2012, Chapter 44, 43	
4/28	T	No class (HFES Health Care Symposium)		
4/30	R	Project presentations		
5/5	T	Project presentations		
5/7	R	Project presentations, Course evaluation		

Syllabus for SSIE 637 Advanced Topics in Healthcare Fall 2015

M & W 2:55–4:25 pm

Lecturer: Chun-An Chou Office: S-03 EB
Office Hours: R 10–12, or by appointment
Email: cachou@binghamton.edu

Teaching Assistant: TBA
Office: T-03
EB Office Hours: TBD
Email: xxx

Prerequisites:

- SSIE537/ ISE437 (A permission is required from the instructor if no prerequisite)
- Basic knowledge of data analytics and operations research
- Programming skills (At least one of programming languages. Most questions in the homework and exam require programming)

Reference List:

- *Practical Predictive Analytics and Decisioning Systems for Medicine: Informatics Accuracy and Cost-Effectiveness for Healthcare Administration and Delivery Including Medical Research* (2015), Linda A. Winters-Miner, Pat S. Bolding, Joseph M. Hilbe, Mitchell Goldstein, Thomas Hill, Robert Nisbet, Nephi Walton, Gary D. Miner, Academic Press (ISBN: 978-0-12-411643-6)
- *Health Analytics: Gaining the Insights to Transform Health Care* (2013), Jason Burke, Wiley (ISBN-13: 978-1118383049)
- *Quantitative Methods in Health Care Management: Techniques and Applications* (2009), Yasar A. Ozcan (ISBN: 978-0-7879-8134-1)
- *Healthcare Operations Management* (2008), Daniel B. McLaughlin and Julie M. Hays, Health Admin- istration Press. (ISBN-13: 978-1-56793-288-1)
- *Building a Better Delivery System: A New Engineering/Health Care Partnership* (2005), Reid, P.R., Compton, W.D., Grossman, J.H. (Book Editors), The National Academy Press. (ISBN-10: 0-309-09643-X).
- *Data Mining: Practical Machine Learning Tools and Techniques* (2011), Ian H. Witten, Eibe Frank, Mark A. Hall. (ISBN: 978-0-12-374856-0)
- Relevant research journal articles will be distributed during the semester.

Course Description:

This course covers major topics in healthcare, including health analytics, medical decision making, healthcare management and logistics, etc. The objective is to learn how to utilize quantitative methodologies in IE/OR and data mining to solve real-life problems for healthcare and/or medicine transformation.

Course Outline: (The outline is subject to change.)

- Introduction to healthcare related topics.
- Data mining and machine learning techniques in healthcare and medicine
- Industrial engineering and operations research methodologies in healthcare and medicine

Grading:

Assignments (5)	20%
Paper Readings and	20%
Mid-term Exam	20%
Final Project *	40%
Participation	bonus

* Students will be required to complete individual research projects. The writing format of final reports follows the standard of conference paper (10 pages). Students will give a 10-15 minute oral presentation. Every component such as assignments and literature reviews would lead students towards the completion of final projects.

A ≥ 90
B 80–89
C 70–79
F < 70

Total points towards the upper limits of the ranges will receive +'s, while total points near the lower limits of the ranges will receive -'s.

Participation: Students are required to fully participate in the class. For example, you bring up any questions when other students review literatures and present their project.

Homework Assignments: Homework will be assigned on a regular schedule. *Late homework will not be accepted* (unless you have the result of an officially excused emergency).

Working Together: Working together on homework is allowed. However, when it comes time for you to write up the solutions, I expect you to do this on your own, and it would be best for your own understanding if you put aside your notes from the discussions with your classmates and wrote up the solutions entirely from scratch. *Working together on exams, of course, is expressly forbidden.*

Absences:

- Students are expected to attend every class. If you are not able to turn in a homework assignment, take a quiz, or take an exam because of an unexcused absence, you will not be able to turn the homework in late or take the quiz or exam. A university excuse from a scheduled class activity such as an exam must be presented in writing no later than two weeks prior to the date of the absence. An absence due to illness or family emergency may be excused, provided that you can supply acceptable written evidence to the instructor (i.e., not the teaching assistant) as soon as possible.
- Students will be notified in advance if the instructor is going to be late for class. However, if an unscheduled conflict or emergency occurs which prevents the instructor (or someone else to take his place) from meeting the class, the students are authorized to leave after 15 minutes.

Academic Honesty: Students will abide by Binghamton University's policy on academic honesty listed in the University Bulletin. Failure to abide by this policy will result in serious consequences, such as a failure in the course. Cheating or plagiarism can lead to expulsion from the University. It is not worth it, so don't do it.

Expectations: I expect that everyone will maintain a classroom conducive to learning. I like an informal atmosphere, but it must be orderly. Thus, everyone is expected to behave with basic politeness, civility, and respect for others. In particular, talking in class is okay if it's part of a class

discussion or with me. Private communications are not, especially during quizzes and tests. Neither are reading extraneous materials, using electronic equipment, or sleeping.

Suggestions: Suggestions for improvement are welcome at any time. Any concern about the course should be brought first to my attention.

Appendix II: Course Descriptions for Other (Core and Elective) Program Courses

SSIE 505, APPLIED PROBABILITY AND STATISTICS
Basic concepts in probability and statistics required in the modeling of random processes and uncertainty. Bayes' formula, Bayesian statistics, independent events; random variables and their descriptive statistics; distribution functions; Bernoulli, Binomial, Hypergeometric, Poisson, normal, exponential, gamma, Weibull and multinomial distributions; Chebyshev's theorem; central limit theorem; joint distributions; sampling distributions; point estimation; confidence intervals; student-t, x squared and F distributions; hypothesis testing; contingency tables, goodness of fit, non-parametric statistics, regression and correlation. Prerequisite: one year of calculus. 3 credits

SSIE 511, ADVANCED PRODUCTION AND SCHEDULE CONTROL
Production scheduling and control. Design/production interface, bills of material, engineering revision control and general concepts of production planning and control for the engineer. Prerequisite: SSIE 510 or consent of department chair. 3 credits

SSIE 519, APPLIED SOFT COMPUTING
Covers relatively new approaches to machine intelligence known collectively as soft computing. Introduces various types of fuzzy inference systems, neural networks and genetic algorithms, along with several synergistic approaches for combining them as hybrid intelligent systems. Emphasis is on applications, including modeling, prediction, design, control, databases and data mining. The undergraduate students are not required to do projects on the same level as the graduate students, and are not required to place the degree of emphasis on hybrids. Prerequisites: basic knowledge of calculus and discrete mathematics, and competence in at least one programming language, or consent of the instructor. Cross-listed with ISE 419. 3 credits

SSIE 520, MODELING AND SIMULATION
Stochastic processes, review of probability and statistics, covariance, input data selection, random number generators, non-parametric tests for randomness, generation of random variates, output data analysis, terminating and non-terminating simulations, model validation, comparison of alternatives, variance reduction techniques, sensitivity analysis, experimental design and predictive models. Prerequisite: SSIE 505 or equivalent. 3 credits

SSIE 522, ADVANCED DECISION MODELING
Course provides a broad foundation in decision models and techniques used in industry and research for technical and managerial problems. Topics include decision theory, risk and uncertainty, value of information, preference measurements, prioritization of alternatives, multiple objectives and hierarchical decisions. This is offered as a dual level course with ISE 422. Prerequisite: SSIE 505 or equivalent. Cross-listed with ISE 422. 3 credits

SSIE 525, PRINCIPLES OF SYSTEMS ENGINEERING
Basic principles of systems engineering applied in transforming client requirements into an operational system. Topics cover the full system life cycle: planning, integrated product/process development, system architecture and design, modeling, requirements analysis, development, integration, test and evaluation. Specialized concepts involved in engineering complex systems are reinforced through case studies and student exercises. Prerequisite: graduate standing or consent of instructor. 3 credits

SSIE 553, OPERATIONS RESEARCH
Operations research (OR) is devoted to the determination of the best course of action of a decision problem, given resource restrictions. Course provides the engineer with a firm grounding in the use of OR (mathematical) techniques devoted to the modeling and analysis of decision problems. Techniques include the following: decision modeling; linear integer and dynamic programming; emerging optimization techniques (e.g., genetic

algorithms, simulated annealing, etc.); game theory; and queueing theory. Problem areas include the following: transportation models; project/production scheduling; inventory models; assignment problems. 3 credits

SSIE 561, QUALITY ASSURANCE FOR ENGINEERS
Statistical quality control, designing for quality, process control, vendor and customer quality issues, quality costs and production. Prerequisites: BS in engineering (any field) and probability and statistics coursework, or consent of department chair. 3 credits

SSIE 621, ADVANCED SIMULATION
This course is intended as an advanced course in simulation modeling for complex systems. This is a project- and research-oriented course designed to give graduate students a foundation from which to explore areas of their own interest. Focused topics include techniques in simulation model design, advanced techniques for output data analysis, comparing alternative system designs, variance reduction techniques, design of experiments for simulation modeling, simulation-based optimization, agent-based and distributed simulation, and continuous process simulation. Prerequisites: SSIE 520 or equivalent, and knowledge of at least one programming language. 3 credits

SSIE 631, FOUNDATIONS OF NEURAL NETWORKS
Covers theory and practical applications of artificial neural networks. Neural networks are a broad class of computing mechanisms with active research in many disciplines, including all types of engineering, physics, psychology, biology, mathematics, business, medicine and computer science. Emphasizes the practical use of neural networks for industrial problems such as pattern recognition, predictive models, pattern classification, optimization and clustering. Topics include learning rules, paradigms and validation. Prerequisites: SSIE 505 or equivalent and SSIE 520. 3 credits

SSIE 633, ADVANCED HUMAN FACTORS ENGINEERING
This course is intended as an advanced course in human factors/ergonomics engineering. The course is project/research oriented in nature to provide the graduate students a foundation from which they can explore areas of their own interests. Focused topics include fundamentals and dynamics of human performance modeling, particularly using digital humans; advanced human factors research and development, including ethics, methods, and analysis tools; human-machine systems modeling and design; human reliability analysis; adaptive hybrid systems; and control theory for humans. Application areas will include quality/process control in manufacturing, healthcare, transportation, aviation, and military systems. Prerequisite: SSIE 533 (or equivalent) or permission of the instructor. 3 credits

SSIE 661, ADVANCED ISSUES IN QUALITY
The topic of quality has taken more and more of a critical nature for manufacturing systems. Course has two components. The first is a practical application of the concepts of quality, including the design and execution of experiments in a real setting. The second is the analysis and study of future issues in the field of quality, such as the development of loss equations, cost of high quality, and people and high quality. Prerequisite: SSIE 566 or a general design of experiments course. 3 credits