FIRST YEAR SEMINAR COURSE PROPOSAL

UNIVERSITY OF MARY WASHINGTON

Use this form to submit **FSEM 100 topics** courses for review **or** any **other existing course** that you wish to have designated to meet the first year seminar requirement.

COURSE NUMBER:	**FSEM 100**			
COURSE TITLE:	**NUMBERS RULE YOUR WORLD**			
SUBMITTED BY:	Karen Anewalt, Stephen Davies, Melody Denhere, Debra Hydorn	**DATE:**	November 17, 2014	
This course proposal has the department's approval. (Put a check in the box to the right.)				

COURSE DESCRIPTION. In the space below, provide a one to two sentence description of this class. The description will be entered in Banner, and will also be used in other publications about the first year seminar program (such as the "Eagle Essentials" booklet).

Data is everywhere and the ability to comprehend all this data and figure out what it's telling us is an important key to guiding our society and mastering our environment. In this seminar students will explore the use of models and simulation to read the stories data can tell us about our world.

RATIONALE. Include short statement addressing how this course meets the FSEM's basic components and new student learning outcomes (see FSEM call above), and why this course should be approved to meet the FSEM General Education requirement.

This course will be based on the topics covered in the book "Numbers Rule Your World" by Kaiser Fung. Through the use of guided discovery activities and examples/case studies, students will learn about models that can be used to describe everyday activities and phenomena, from mouse clicks and movie ratings to touchdowns and tweets. Through simulations and other activities students will develop their own understanding of how models can be applied to data, which will lead to greater understanding of the processes that produced the data. They will then apply what they have learned and share their discoveries with each other through papers and presentations about models and data. Working in small groups, students will use computer and other simulations to explore models for queues, epidemics and diagnostic tests, for example. Using simulations they will manipulate the models to fit existing data or to find an optimal solution. Students will be asked to write up technical reports of their findings from class activities and they will provide informal reports to the class on their results which will lead to a class discussion to compare their results. They will also complete a research project to learn more about one of the class topics (e.g., queues, epidemics, diagnostic tests) and give an oral presentation summarizing their research.

SYLLABUS. *Attach a course syllabus***.**

SUBMIT this form and attached syllabus electronically as one document to John P. Broome (jbroome@umw.edu). All submissions **must** be in electronic form.

FSEM 100 Numbers Rule Your World Spring 2015

Instructor: Dr. Debra L. Hydorn, Dr. Karen Anewalt, Dr. Stephen Davies or Melody Denhere

Office: To be completed by the assigned professor
Office phone:
Office Hours:

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Resource: *Numbers Rule Your World*, by Kaiser Fung

First-Year Seminar Student Learning Outcomes:

1. *Utilize a variety of research techniques to retrieve information efficiently, evaluate retrieved information, and synthesize information effectively to support their messages or arguments.*
2. *Improve development and organization of written arguments.*
3. *Demonstrate the ability to edit and revise in the writing process.*
4. *Apply the basic theories and principles of oral communication.*
5. *Communicate effectively in a variety of settings, including public speaking and group discussion.*

Course Description

Data is everywhere. The "Information Age" has unleashed a deluge of facts and figures that describe everything in our world, from mouse clicks and movie ratings to tweets and touchdowns. We count and measure everything we can think of, in an effort to quantify and understand it. The ability to comprehend all this data and figure out what it's telling us is an important key to guiding our society and mastering our environment. Numbers truly do rule our world.

In this seminar we will study the state-of-the-art techniques for gathering, sifting, dissecting, and understanding the vast quantities of numerical information that the human race is generating. We'll learn how statistics and computer science can be used to unlock the secrets that data holds, and to lay bare its patterns and trends. We'll generate simulations that help us understand how the world works, and learn how to use those computational models to help explain the past and predict the future. It's an exciting adventure, and will make you appreciate how numbers hold more mystery and power than you probably ever dreamed of!

Grading:

Homework	25%
2 Group Projects	40%
1 Individual Presentation	10 %
Participation	20%
Completion of QEP modules	5%

The grading scale is:

A: 94 – 100%
A- : 90 – 93
B+: 86 – 89
B : 82 – 85
B- : 79 – 81
C+: 75 – 78
C : 71 – 74
C- : 68 – 70
D+: 64 – 67
D : 60 – 63

Midterm progress reports are based on the work completed to that point.

The grading scale will be:
S: 71% or above
U: 70% or below

F : < 60%

Topics:
The course will consist of approximately 4 units where each unit is either one of the topics from the Fung book or an additional topic from one of the other course sources. For each unit students will take part in a group exploration activity in class followed by readings from the Fung book and a homework assignment where students will use a simulation tool to answer questions about the model. Class discussion will focus on issues raised in the Fung book and supplemental readings, as well as the individual student's experiences and observations in the exploration activities. At midterm students will be divided into groups to complete a follow-up exploration for one of the topics covered to that point. They will give a group presentation to the class on their findings. A second group exploration activity will take place at the end of the course on the topics covered since midterm. For the individual presentation students will report on a news article or other source that reports on a current application of one of the course topics. Examples could include an article on a flu epidemic or the development of a new allergy medication. The individual project assignment will be modularized to require a topic proposal, annotated bibliography, draft of the presentation (notes and visual aides), and the final oral presentation. Similar scaffolding will be required for the group projects. Throughout the course, students will be exposed to support available on campus including the research librarians, writing center, and speaking center.

Possible units (from the Fung book):

1. Queues – examples are Fast Passes at Disney World and the use of on-ramp traffic lights on high ways; an activity might be to have students design a queuing system to meet certain specifications
2. Models – examples are epidemiology and credit scores; have students explore on online epidemic simulation
3. Identifying and measuring group differences – examples are the fairness of SAT questions between groups of students and insurance risk pools; we could provide an overview of statistical hypothesis testing to supplement what's in the book
4. Diagnostic testing – examples include drug testing and polygraph tests; we could have students consider additional situations and explore when false positives are worse than false negatives, for example, or situations where they are both bad; we can also explore additional diagnostic tests such as the ELISA test for HIV or pregnancy tests
5. Probability – examples are jet crashes and lottery jackpots; there are many other probability examples to explore; the book mentions Bayes' Theorem but doesn't do a lot of calculations
6. Additional topics could include data crunching (examples from the Super Crunchers book) or topics from the Model Thinking Coursera course (such as the Schelling model, six sigma models, tipping points)

The participation grade will be determined by the degree to which students contribute to class discussions and other activities. It will also be determined by peer evaluations from group projects and presentations.

Honor code: You will work with a group to complete course projects; groups will determine what each group member is expected to contribute to the group assignment and each student is expected to complete their assigned portion. Homework assignments are to be done individually. Students may not use Internet or other unapproved resources for completing portions of assignments.

Policies: Regular attendance is expected. If you miss class it is your responsibility to learn what was covered that day and if any announcements or assignments were made – **e-mail me or a classmate to find out what you missed**. **If you miss class when an assignment is due don't assume that you can turn it in at the next class period because you weren't in class**. If you have questions concerning assignments, please see me during office hours or contact me through e-mail. Successful course performance depends on regular completion of all assignments. You are expected to keep up with the assignments and to check that you understand each concept and procedure. If you are a member of a sports team or other extra-curricular organization that may take you away from campus for scheduled events, or if you anticipate missing class for religious or other activities, you must let me know at the beginning of the semester and indicate any potential conflicts with exams or assignment due dates.

The weekly schedule provided below is subject to change depending on material covered in class. Please **mark**

your calendar and make any travel arrangements for fall break or the end of the semester with these dates in mind. All graded work must be **pledged** and must be turned in on time to avoid any late penalty. If you are unable to turn in an assignment during the class period on the day when it is due, **I require written confirmation at that time of when the assignment will be completed; otherwise it will not be accepted.** If you are ill, an e-mail to me will serve as your written confirmation. **In most cases late assignments must be submitted by noon the day after the assignment was due. If you need more time than that then you must make arrangements with me about requesting additional time.** Late assignments will be graded at my convenience and may not be returned until the end of the semester. No assignments will be accepted after the solution set has been posted in Canvas and no assignments will be accepted after the last day of class.

The **Office of Disability Services** has been designated by the University as the primary office to guide, counsel, and assist students with disabilities. If you already receive services through the Office of Disability Services and require accommodations for this class, make an appointment with me as soon as possible to discuss your approved accommodation needs. Please bring your accommodation letter with you to the appointment. I will hold any information you share with me in the strictest confidence unless you give me permission to do otherwise. If you have not contacted the Office of Disability Services and need accommodations, such as note taking assistance or extended time for tests, their phone number is 540-654-1266. The office will require appropriate documentation of disability. If your disabilities accommodations include extra time on tests make sure to remind me about at the class period before the test so that we can make appropriate arrangements for you to take the test.

Draft weekly schedule

Week	Topics
1	Introduction to modeling and simulation, including software tools to be used
2	Introduction to topic 1 (e.g., queueing theory)
3	Topic 1 explorations
4	Topic 1 assignments
5	Introduction to topic 2 (e.g., epidemiology)
6	Topic 2 explorations
7	Topic 2 assignments
8	Project #1
9	Introduction to topic 3 (e.g., diagnostic testing)
10	Topic 3 explorations
11	Topic 3 assignments
12	Introduction to topic 4 (e.g., probability)
13	Topic 4 explorations
14	Topic 4 assignments
15	Project #2
Final	Individual presentations