

MATH415

STUDENT WARNING: This course syllabus is from a previous semester archive and serves only as a preparatory reference. Please use this syllabus as a reference only until the professor opens the classroom and you have access to the updated course syllabus. Please do NOT purchase any books or start any work based on this syllabus; this syllabus may NOT be the one that your individual instructor uses for a course that has not yet started. If you need to verify course textbooks, please refer to the online course description through your student portal. This syllabus is proprietary material of APUS.

Course Summary

Course : MATH415 **Title :** Operational Simulation

Length of Course : 8

Prerequisites : MATH330, MATH375 **Credit Hours :** 3

Description

Course Description: This course examines various mathematical concepts and problem solving techniques and introduces discrete system simulation, Monte Carlo methods, discrete event modeling techniques, programming considerations, statistical definitions and concepts, random number generation, and output analysis. This will be a problem solving course which will emphasize tools that can be used during the analysis phase of real world problems. (Prerequisites: MATH330 AND MATH375)

Course Scope:

MATH415 is a distance learning course designed to help students working towards an emphasis in the operational research areas of mathematics. Successful completion of this course will provide you with a working knowledge of statistical simulations in the operational research concentration area. Topics covered include discrete system modeling definition, application of concepts to simulations including Monte Carlo techniques, discrete event considerations, random number generators and their applications, and output analysis for each type of model.

Objectives

After successfully completing this course, you will be able to:

- CO-1 Perform basic statistical analysis and calculations.
 - CO-2. Apply statistical concepts to system simulations.
 - CO-3. Solve Monte Carlo simulations and apply to real life applications
 - CO-4. Solve discrete event models and discuss applications to working models.
 - CO-5. Investigate programming considerations for various model simulations.
 - CO-6. Use random number generators to model working life scenarios.
 - CO-7. Compare output analysis from various models.
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Outline

Week 1: Chapter 1 Introduction to Simulation

Learning Objectives

CO-1 Perform basic statistical analysis and calculations

Readings

Read and study Chapter 1

Sections 1.1 – 1.12

Assignment

Forum Post - Introduce yourself on the Introduction Discussion Forum and get to know your classmates. Remember; your post must be at least 250 words.

Suggested Practice Problems 1b, 1e, 4, 5

Week 2: Chapter 2 Simulation Examples

Learning Objectives

CO-2 Apply statistical concepts to system simulations

CO-3 Solve Monte Carlo simulations and apply to real life applications

Readings

Read and study Chapter 2

Sections 2.1 – 2.6

Assignment

Forum Post – Pick a problem from pages 83-86 #21,22,23,24,26,28,29,30,31,33,35,36,37,38,39 and apply the new data to one of the 12 downloadable spreadsheets in Lesson.

Suggested Practice Problems 1, 2, 4, 12

Week 3: Chapter 3 General Principles Chapter 4 Simulation Software

Learning Objectives

CO-2 Apply statistical concepts to system simulations

CO-4 Solve discrete event models and discuss applications to working models

CO-5 Investigate and compare programming considerations for various models

Readings

Read and study Chapters 3 & 4

Sections 3.1 – 3.3

Sections 4.1 – 4.8

Assignment

Forum Post – Pick a problem from suggested practice problems in Chapters 3 & 4 and solve in forum.

Suggested Practice Chapter 3 Problems # 1, 2, 3

Chapter 4 Problems #1, 2, 4, 9

Week 4: Midterm

Learning Objectives

Readings

Chapters 1 - 4

Assignment

Forum Post – How are you doing on your project? Questions, Suggestions, etc.

Week 5: Chapter 5 Statistical Models in Simulation Chapter 6 Queuing Models

Learning Objectives

CO-2 Apply statistical concepts to system simulations

CO-4 Solve discrete event models and discuss applications to working models

Readings

Read and study Chapters 5 & 6

Section 5.1 – 5.7

Sections 6.1 – 6.8

Assignment

Forum Post – Solve a problem from suggested practice problems in Chapters 5 & 6 and post for the class.

Suggested Practice Problems

Chapter 5 # 2, 5, 10, 14, 18, 26, 34

Chapter 6 # 1, 4, 5, 11, 20

Week 6: Chapter 7 Random Number Generator Chapter 8 Random Variable Generator

Learning Objectives

CO-6 Use random number generator to model working life scenarios

Readings

Read and study Chapters 7 & 8

Sections 7.1 – 7.5

Sections 8.1 – 8.4

Assignment

Forum Post – Solve a problem from suggested practice problems in Chapters 7 & 8 and post for the class.

Suggested Practice Problems TBD

Week 7: Chapter 9 Input Modeling

Learning Objectives

CO-7 Examine and compare output analysis from various models

Readings

Read and study Chapter 9
Sections 9.1 – 9.8

Assignment

Forum Post – Comments on the project as you finish up.

Suggested Practice Problems TBD

Week 8: Final Exam Project Due

Learning Objectives

Readings

Chapters 5 - 9

Assignment

Forum Post – Debriefing on the class.

Evaluation

Staying on task and adhering to the published schedule are typically among the most challenging aspects of completing an academic course successfully. This is especially true for online and part-time non-resident programs. To avoid the pitfall of falling behind, students in this course should complete the assigned reading and review the PowerPoint presentations posted in the Lessons section of the classroom in a timely manner. Students should also complete the Suggested Practice Problems as set forth in the schedule provided in the Course Outline of this syllabus. Suggested Practice Problem sets will not be graded, but their solutions will be posted in the Suggested Problem Solutions folder in the Resources section of the classroom. Students should refer to these solutions as a means to confirm their understanding of the topics covered throughout the course.

Student grades for the course will be based on class discussion/forums, a project, a midterm exam, and a final exam.

Class Participation in Forums: I urge you to utilize the Question and Answer Forum as a means to interact with your classmates. If while working through examples or problems from our textbook you have a question or a comment, please post the question or comment in the Question and Answer Forum. Naturally, I hope that question and answers posted in the Question and Answer Forum will facilitate interactions among the members of our class.

A total of 10% of the final grade will be based on participation in the Forums.

The Week 1 Introduction Forum: During the first week of class each student must make a post to the Week 1 Introduction Forum. You are to use this Forum to introduce yourself and state your goals and objectives as they relate to our course. You are required to make a post to the Week 1 Introduction Forum in order to complete your enrollment in the course. Your post must be **at least 250 words**, and you must complete it by the end of the first week. This is a university requirement. To make a post to the Week 1 Introduction Forum, click on the Forum topic link, then click Post New Thread. In the title block of the dialog box that appears kindly insert your first and last name; compose your post in the message box; and then click Post Message.

Besides completing your enrollment in the course, the Week 1 Introduction Forum is designed to 1) build peer-to-peer relationships by introducing oneself and one's background to the class; 2) to articulate individual student learning goals and/or expectations for the class. Therefore, in your introduction you may wish to touch upon the following:

1. Who you are and how you would like to be addressed.
2. Your academic major or program of study.
3. Your current status in your program of study.
4. Your academic goals including why you are taking this course and what you hope to achieve by completing it.
5. Other information about yourself that you would like to share and might help others know you better.

Project: The project will count as 40% of the final grade. It will be based on course work and topics presented. The project will consist of a simulation using Microsoft Excel and a paper. Both are due on the last day of the course.

Exams: There will be a midterm examination, worth 25% of your final grade during Week 4 and a final examination worth 25% of your final grade in the last week of the class. Each exam will be an online, open-book, open-note exam. You may not consult with any other person while taking the exam. This examination will be based on all material covered during the course of the semester. Please coordinate with the professor for any special arrangements. Unless the professor approves alternate arrangements, students should plan to take the final examination during the last week of the course. You will not need a proctor to take this exam.

Specific instructions will be provided for the midterm and the final in the Announcements section of our classroom at the outset of the week.. Clearly, student-teacher relationships are built on trust. This is especially true in the case of an online course. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that students complete assignments as directed. Acts that violate this trust undermine the educational process and compromise the integrity. Don't cheat. Don't compromise your integrity. To do so invalidates the very purpose which likely motivated you to undertake this course—to learn, to become a better decision maker, to broaden your perspective, and to increase your skill set.

At the beginning of the week in which they are due, exams will be posted in the Tests & Quizzes section of our classroom. When you are prepared to take an assessment go to the Tests & Quizzes section of our classroom and click on the assessment. It is important for you to understand that you will be able to submit your answers to an assessment only once. Your answers must be submitted by the 11:55PM Eastern time deadline, as indicated in the syllabus. I will not accept late submissions. So, please don't wait until the last minute to submit your answers to a quiz or exam. As soon as you submit your answers your assessment will be graded, and your score will be recorded in the Gradebook. Twenty-four hours after the deadline and once everyone has submitted their answers, you can access the feedback by clicking on the assessment in the Tests & Quizzes section of our classroom. Naturally, if you answer any of the questions on an assessment incorrectly I urge you to review the feedback and reconcile any errors you may have made on a quiz or exam.

The Final Examination will be count as 25% of the final grade. It will be a three hour, online, open-book, open-note exam. The final exam will cover all of the material presented during our course. You will be able to access the Final Exam only once. So, be sure to set aside a dedicated three hour period in which to complete it. You may not consult with any other person while taking the exam.

The notations used in statistical work aren't found in many word processing programs, making it difficult to produce many of the symbols used in our course. You may wish to use the Symbol font in Microsoft Word and the Insert/Object/Microsoft Equation feature in Word when preparing documents related to our course. Insert/Symbol is also sometimes useful. Of course, you will also want to familiarize yourself with the Insert/Edit Equation feature contained in the Rich Text Editor that is available in the Forums section of our classroom. Additionally, since many of the computations and analyses required in our course can be easily carried out using Microsoft Excel, you may wish to familiarize yourself with the process whereby Excel outputs can be copied and pasted into a Word or pdf file.

Assignment Deadlines: Students must plan and manage competing demands and priorities on their time and are expected to submit classroom assignments on time. Assignment due dates and times are explained in the Lessons. All assignments must be submitted by the last day of class unless you have an approved course extension.

Instructors will submit student course grades to the University within seven days after the end of the semester.

Official grades will continue to be issued by the University on the grade report form.

Please see the [Student Handbook](#) to reference the University's [grading scale](#).

Grades for the course will be based on the following.

Grading:

Name	Grade %
APUS Honor Pledge	1.00 %
APUS Honor Code and Pledge	1.00 %
Forums	10.00 %
Introductory Forum	2.00 %
Forum - Week 2	1.00 %
Forum - Week 3	1.00 %
Forum - Week 4	1.00 %
Forum - Week 5	1.00 %
Forum - Week 6	1.00 %
Forum - Week 7	1.00 %
Forum - Week 8	2.00 %
Midterm Exam	25.00 %
Midterm Exam 1	25.00 %
Final Exam	25.00 %
Final Exam 1	25.00 %
Project	40.00 %
Project Proposal	4.00 %
Project Paper	16.00 %
Project Simulation	20.00 %

Materials

Book Title: Discrete-Event System Simulation, 5th ed. - The VitalSource e-book is provided via the APUS Bookstore

Author: Banks, et. al.

Publication Info: Pearson

ISBN: 9781269570022

Book Title: You must validate your cart to get access to your VitalSource e-book(s). If needed, instructions are available here - <http://apus.libguides.com/bookstore/undergraduate>

Author: N/A

Publication Info: N/A

ISBN: N/A

Web Sites – www.bcnn.net

In order to use the video presentations, each student's computer should have a color monitor with 16 bit color or greater video card; 800x600 pixels or greater monitor resolution; soundcard; speakers or headphones. PCs should be Pentium 200 MHz or faster with Windows 96, 98, 2000, NT 4.0, XP or later; 128 MB RAM. MAC should have Power PC 120 MHz or faster with Mac OS 8.1 or later and 128 MB RAM.

Students will need a scientific calculator which includes the trig functions to successfully complete this course. The calculator should include a memory and square root function. Students are required to have access to Microsoft Excel. It will be used extensively for simulations and is needed for course project.

Course Guidelines

Citation and Reference Style

- Attention Please: Students will follow the APA Format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in the APA Format.

Tutoring

- Tutor.com offers online homework help and learning resources by connecting students to certified tutors for one-on-one help. AMU and APU students are eligible for 10 free hours* of tutoring provided by APUS. Tutors are available 24/7 unless otherwise noted. Tutor.com also has a SkillCenter Resource Library offering educational resources, worksheets, videos, websites and career help. Accessing these resources does not count against tutoring hours and is also available 24/7. Please visit the APUS Library and search for 'Tutor' to create an account.

Late Assignments

- Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. The due date for each assignment is listed under each Assignment.
- Generally speaking, late work may result in a deduction up to 15% of the grade for each day late, not to exceed 5 days.
- As a working adult I know your time is limited and often out of your control. Faculty may be more flexible if they know ahead of time of any potential late assignments.

Turn It In

- Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases professors may require students to use Turnitin.com. This is automatically processed through the Assignments area of the course.

Academic Dishonesty

- Academic Dishonesty incorporates more than plagiarism, which is using the work of others without citation. Academic dishonesty includes any use of content purchased or retrieved from web services such as CourseHero.com. Additionally, allowing your work to be placed on such web services is academic dishonesty, as it is enabling the dishonesty of others. The copy and pasting of content from any web page, without citation as a direct quote, is academic dishonesty. When in doubt, do not copy/paste, and always cite.

Submission Guidelines

- Some assignments may have very specific requirements for formatting (such as font, margins, etc) and submission file type (such as .docx, .pdf, etc) See the assignment instructions for details. In general, standard file types such as those associated with Microsoft Office are preferred, unless otherwise

specified.

Disclaimer Statement

- Course content may vary from the outline to meet the needs of this particular group.

Communicating on the Forum

- Forums are the heart of the interaction in this course. The more engaged and lively the exchanges, the more interesting and fun the course will be. Only substantive comments will receive credit. Although there is a final posting time after which the instructor will grade comments, it is not sufficient to wait until the last day to contribute your comments/questions on the forum. The purpose of the forums is to actively participate in an on-going discussion about the assigned content.
- “Substantive” means comments that contribute something new and hopefully important to the discussion. Thus a message that simply says “I agree” is not substantive. A substantive comment contributes a new idea or perspective, a good follow-up question to a point made, offers a response to a question, provides an example or illustration of a key point, points out an inconsistency in an argument, etc.
- As a class, if we run into conflicting view points, we must respect each individual's own opinion. Hateful and hurtful comments towards other individuals, students, groups, peoples, and/or societies will not be tolerated.

University Policies

[Student Handbook](#)

- [Drop/Withdrawal policy](#)
- [Extension Requests](#)
- [Academic Probation](#)
- [Appeals](#)
- [Disability Accommodations](#)

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