

**BUDT758Z: Simulation with ARENA**  
**Spring 2020 Term D (Online Instruction)**  
**Syllabus**

**Instructor:** Dr. Melanie L. De Grano

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Office: Virtual

Office Hours: Tu&Th 2:30-3:50 pm virtual (after lecture), and by appointment

**Teaching Assistant:** Harsh Patel

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Office: Virtual

Office Hours: M&W 2:00 -3:00 pm virtual, and by appointment

**Course Meeting Times and Location:** Tu&Th 2:00 pm via Zoom <https://umd.zoom.us/j/106091247>

**Course Description:** This course covers the use of discrete-event simulation as a decision support tool for modeling and analyzing business problems. Through this course, students will gain experience in formulating simulation models, implementing simulation models using computer software, performing experiments, and interpreting simulation output. Real-world examples and readings from literature will be incorporated as much as possible.

**Prerequisites:** A basic understanding of probability and statistics (equivalent to BMGT230 or BUS1758B). Exposure to computer programming (e.g., MATLAB, Python, R, etc.) is useful, but is not required.

**Textbook:**

Simulation with Arena, 6<sup>th</sup> ed.

W. David Kelton, Randall P. Sadowski, and Nancy Swets

McGraw-Hill Science/Engineering/Math

ISBN-IO: 0073401315 (6<sup>th</sup> ed.)

ISBN-13: 978-0073401317 (6<sup>th</sup> ed.)

**Software:** We will use **Arena Simulation Software Version 15.1.0004** (32 bit) in this class. Arena Simulation Software is available to download (at no cost) from <https://www.arenasimulation.com/simulation-software-download>. You will have to register with your University e-mail address in order to download the software. Simulation Software is only Windows-compatible; therefore, Mac OS users will need to install a virtual instance of Windows on their machines. The University of Maryland provides licenses to students for the latest version of VMWare Fusion, which is a virtualization software package that can be used to run Windows (and any other operating system) in Mac OS. Alternatively, you could use Boot Camp (included in Mac OS), VirtualBox (open source), or Parallels Desktop (\$80 after free trial), but these options will require more effort or money on your part to configure. Arena Simulation software is also available on vsmith under student desktop. The best way to learn software is with hands-on experience! **Please have Arena installed or plan to access Arena via vsmith from your laptop.**

**Course Webpage:** The Canvas course page is accessible at [elms.umd.edu](https://elms.umd.edu). Please plan to check Canvas regularly for the most up-to-date information, and make sure you have Canvas notifications turned on. The course

lecture recordings, handouts, assignments, solutions, and other course materials will be posted on the website. The course website must be used to submit assignments. Please type up your assignments using Microsoft Word or whatever other package you use for word processing. You should design any spreadsheets so that they are easy to follow. It is easy to annotate spreadsheets by adding text boxes or typing in nearby cells. When you submit an assignment, if it is a single file, name your file your login name under the course website system followed by the assignment number; for example: mdegrano\_Assignment1.doc. If you have more than one file, create a single .zip file containing all your files. In this case, name your file your login name followed by the assignment number and the extension .zip; for example, mdegrano\_Assignment1.zip. Please submit only one file for each assignment.

**Attendance:** Due to the nature of online instruction, it may be difficult for students to attend all live sessions. I will be providing pre-recorded lectures, external video links, and/or handouts prior to the course meeting time to allow students with connectivity issues, time zone differences, and potential home responsibilities and distractions more time to complete the work. Our live sessions (Tues & Thurs at 2 pm) will be informal 20-30 minute meetings. If there is something you would like to discuss during the designated course time, you may email me with a list of questions.

### **Course Outline:**

Note: Order of presentation may vary from the sequence stated below based on student questions/interest.

1. Introduction and basic modeling concepts
2. Basic simulation concepts
3. Introduction to Arena
4. Input Data Analysis
5. Random variable and variate generations
6. Verification and validation
7. Output analysis
8. Conducting successful simulation projects
9. Simulation applications in industry

### **Grading:**

Independent assignments:	25%	
Group assignments:	25%	
Quizzes:	25%	
Final Exam:	25%	Due by Thursday, May 14, 2020 (format TBD)

Some assignments will be group assignments (up to 4 people) and others will be independent learning activities. There will be no make-ups for any assignments or exams. The only exception is for students with an emergency and proper documentation. Quizzes will be given on most weeks. **You may drop your lowest quiz score.**

**Questions:** All students are encouraged to bring questions, concerns and comments to my attention as soon as they arise. Please do not wait! I will consider errors in grading for up to one week after the grade is posted on Canvas. After that, the grade will not be changed. Once final course grades are submitted, changes to grades will only be made to correct errors in tallying scores.

**Special Needs:** Any student with special needs should bring this to the attention of the instructor as soon as possible, but not later than the end of the first week of class. Documentation from the Disability Support Service Office (DSS; 301-314-7682 or [dissup@umd.edu](mailto:dissup@umd.edu)) should be provided when appropriate.

**Religious observances:** If your religious observances conflict with any aspect of the course activities, please bring this to the attention of the instructor to discuss alternative arrangements.

**Academic Integrity:** The University's Code of Academic Integrity is designed to ensure that the principles of academic honesty and integrity are upheld. All students are expected to adhere to this Code. The Robert H. Smith School does not tolerate academic dishonesty. All acts of academic dishonesty will be dealt with in accordance with the provisions of this code. Please visit the following website for more information on the University's Code of Academic Integrity: <https://president.umd.edu/administration/policies/section-iii-academic-affairs/iii-100a>. On each exam or assignment, you will be asked to write out and sign the following pledge: "I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment."

**Right to change Information:** Although every effort has been made to be complete and accurate, unforeseen circumstances arising during the semester could require the adjustment of any material given here. Consequently, given due notice to students, the instructor reserves the right to change any information on this syllabus or in other course materials.

#### **Guiding Principles for Transition to Online Instruction (from Brandon Bayne, UNC - Chapel Hill)**

1. Nobody signed up for this.
  - Not for the sickness, not for the social distancing, not for the sudden end of our collective lives together on campus
  - Not for an online class, not for teaching remotely, not for learning from home, not for mastering new technologies, not for varied access to learning materials
2. The humane option is the best option.
  - We are going to prioritize supporting each other as humans
  - We are going to prioritize simple solutions that make sense for the most
  - We are going to prioritize sharing resources and communicating clearly
3. We cannot just do the same thing online.
  - Some assignments are no longer possible
  - Some expectations are no longer reasonable
  - Some objectives are no longer valuable
4. We will foster intellectual nourishment, social connection, and personal accommodation.
  - Accessible asynchronous content for diverse access, time zones, and contexts
  - Optional synchronous discussion to learn together and combat isolation
5. We will remain flexible and adjust to the situation.
  - Nobody knows where this is going and what we'll need to adapt
  - Everybody needs support and understanding in this unprecedented moment

#### **Instructor Bio:**

Melanie De Grano is a managing consultant in IBM's Advanced Analytics and Watson (AAW) Public Sector Consulting group. She has 12+ years of research and consulting experience applying discrete-event simulation, statistics, and mathematical modeling to assist clients with decision-making and policy formulation. She has extensive experience in designing, developing, and testing decision support software for government agencies. She received her B.S., M.S., and Ph.D. degrees in Industrial Engineering and Operations Research from Penn State University. Melanie has taught courses in simulation, process quality engineering, engineering statistics, and engineering economics. She is a member of INFORMS. She joined the Robert H. Smith School of Business at University of Maryland as an Adjunct Professor in Spring Semester of 2020.