ABET Course Syllabus for IND E 424: Simulation

1. **Course number and name:** IND E 424: Simulation

2. **Credits and contact hours:** 4 credit hours, 4 hours per week.

3. **Instructor’s name:** Benita Beamon

4. **Textbook, title, author, and year:**

4a. **Other supplemental materials:**
    - Arena® software, online lecture notes, technical handouts

5. **Specific course information:**
   5a. **Brief description of the content of the course (catalog description):** In this course, students will learn the processes, tools, and techniques for performing effective simulation analyses, specifically: i) (the basic underlying principles of) how simulations work, ii) how to collect and analyze input data, iii) how to build basic simulation models using Arena, iv) how to verify and validate simulation models, and v) how to interpret (and perform statistical analyses of) simulation output.

5b. **Pre-requisites or co-requisites:** IND E 411 and IND E 337.

5c. **Required, elective, or selected elective (as per Table 5-1) course in the program:** Elective.

6. **Specific goals for the course:** This course is an introductory course in simulation theory and modeling. Therefore, the objectives of this course are for students to understand the underlying mechanisms for how simulations work and to be able to design, execute, verify, validate, and analyze the output of a simulation experiment using Arena.

6a. **Specific outcomes of instruction:**
   - Students will be able to develop simulation studies in manufacturing and service applications.
   - Students will be able to compare simulated systems on the bases of designed performance metrics.
   - Students will be able to collect and model input data and analyze simulation output.

7. **Brief list of topics covered:**
   - Simulation of a Queuing System (Hand Simulation)
   - A Guided Tour Through Arena®/Simple Processing System
   - Key Probability Distributions
   - Input Modeling and Data Collection
Input Analyzer, Modeling Basic Arena® Operations, Animation Verification and Validation
Advanced Arena® Operations: Sets, Variables, and Expressions
Output Analysis, Tests for Random Numbers
Output Analyzer
Warm-up Periods
OptQuest
Generating Random Numbers and Random Variates
Monte Carlo Simulation