CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

**IE 429/L**

COURSE SYLLABUS

1. **Course number and name**: IE 429/L Discrete Systems Simulation/Laboratory
2. **Credits and contact hours:** 3/1 credits, three 50-min lectures/ three 50-min lab
3. **Instructor’s or course coordinator’s name:** Sima Parisay (course coordinator)
4. **Text book, title, author, and year:**

Text: Parisay’s Lab Manual and Supplementary Notes

Software: Arena by Rockwell Software http://www.arenasimulation.com/

1. **Specific course information**
2. **Brief description of the content of the course (catalog description):**

Application of discrete-event simulation concepts and tools to improve or design a system in industry (i.e. material handling) and business. System theory, data collection, verification and validation. Software applications. Analysis and report writing skills.

1. **Prerequisites or co-requisites:**

Prerequisite:IME 312

1. **Indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program:**

Required course

1. **Specific goals for the course**
2. Specific outcomes of instruction
3. Students will learn system theory and basic concepts in discrete-event simulation field: modeling, data collection for input parameters, output analysis, verification and validation, and experimentation.
4. Students will learn creating a simulation model using software (Arena or ProModel) to improve or design a system in industry and business.
5. Students will develop critical thinking and creativity skills through project and design of experiment (sensitivity analysis)
6. Students’ communication skills will improve through writing reports, team work, and occasional presentation

1. **Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course:**

Table A.6-1 Criterion 3 Student Outcomes (SO) Addressed by the Course Outcomes Check List

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a | b | c | d | e | f | g | h | i | j | k | l | m |
| **Outcomes:**  **I = Introduction**  **K = Knowledge S = Skill**  **A = Application or Ability** | Apply knowledge | Design Experiments | System Design | Interdisciplinary Teamwork | Problem Solving | Professionalism & Ethics | Communication Skills | Global & Societal Impact | Lifelong Learning | Contemporary Issues | Engineering Skills & Tools | Business Skills | Employability |
| 1 | KS | K | K | I | K | I | IK | I |  | I | KS | K | K |
| 2 | IKS |  | KS |  |  | I | KS |  |  | I | KS |  | S |
| 3 | KS | S | SA |  | KS | I | S |  | K |  | S |  | SA |
| 4 | KS |  |  |  |  | I | S |  | K |  | S |  | S |

1. **Brief list of topics to be covered**

* Introduction to Queuing Theory
* Fundamental simulation concepts
* Preparing for modeling: data collection, creating a Logical Model to match the goal of study
* Arena’s modeling features (Modules)
* Analysis of statistical output and writing report
* Probability distributions, Goodness-of-Fit test, Input Analyzer
* Verification and validation
* Output Analyzer and its application
* Deciding on transient period, run length, and number of replications
* Modeling material handling
* Randomness effect, random numbers and variables generation
* Animation
* Design of experiment
* Future of simulation field

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Assessment Matrix for Lower Division Skills & Abilities** | **Outcomes: I = Introduction, K = Knowledge, S = Skill development, A = Application or Ability (Courses in yellow are in IME Outcomes Assessment Survey)** |  | **IE429** |
| a | **Apply knowledge** | Ability to apply knowledge of foundational material in the sciences and communication arts (LD) |  |  |
|  |  | Ability to apply advanced material in the discipline (UD) |  | IKS |
| b | **Design Experiments** | **Ability to design and conduct an experiment** |  |  |
|  |  | **Ability to interpret statistical qualitative information and apply experimental results to improve a system or process** |  | KS |
| c | **System Design** | Understand system design concepts and approaches and how to assess the interaction between sub-systems. |  | KSA |
|  |  | Ability to design a part or process as part of an overall system. |  |  |
| d | **Interdisciplinary Teamwork** | Be able to successfully function on an interdisciplinary team. |  | I |
|  |  | Be able to successfully lead an interdisciplinary team. |  |  |
| e | **Problem Solving** | Ability to identify problems and determine their root causes. |  | KS |
|  |  | Ability to apply engineering approaches **and current methodologies** to problem solving |  |  |
| f | **Professionalism & Ethics** | Knowledge of what constitutes professional and ethical behavior |  | I |
|  |  | Understanding of ethical issues and methods for resolving moral dilemmas. Exhibit professional behavior in all work and conduct. |  | I |
| g | **Communication Skills** | Demonstrate the ability to **develop** a mathematical model and disseminate it so others can understand it. |  |  |
|  |  | Ability to prepare, interpret and communicate via graphical models |  | IKS |
|  |  | Ability to prepare concise written material and present it in a professional manner. |  | S |
| h | **Global & Societal Impact** | Understanding of diversity between cultures, countries, and groups. |  | I |
|  |  | Understand the global dimensions and trends of technological, societal, economic, and environmental issues. |  |  |
| i | **Lifelong Learning** | **Ability to recognize the need for and be able to pursue life long learning** |  | K |
|  |  | Ability to adapt to changing professional requirements. |  |  |
| j | **Contemporary Issues** | Awareness and understanding of contemporary issues including organizations and resources that could be used for further enrichment. |  | I |
|  |  | An understanding and appreciation of how contemporary issues interact with each other and the profession. |  |  |
| k | **Engineering Skills & Tools** | Knowledge and ability to choose proper tools for design and problems solving. |  |  |
|  |  | Effective use of software and other tools to design and solve problems |  | KS |
| l | Business Skills | Understand financial aspects of business organizations and make viable recommendations to management. |  | K |
|  |  | Ability to manage projects and resources efficiently and effectively. |  |  |
| m | Employability | Professional employment upon graduation |  | KSA |
|  |  | Ability to develop and manage a long-term career plan |  |  |