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| antalya bilim Ã¼niversitesi ile ilgili gÃ¶rsel sonucu | **ECTS Course Description Form** |
| **PART I ( Senate Approval)** |
| **Offering School**  | *College of Engineering* |
| **Offering Department** | *Industrial Engineering* |
| **Program(s) Offered to** | *Industrial Engineering* | *Mandatory* |
| *Computer Engineering, Civil Engineering* | *Elective* |
| *Electrical and Electronics Engineering* | *Elective* |
| **Course Code**  | *IE 381* |
| **Course Name** | *Simulation* |
| **Language of Instruction** | *English* |
| **Type of Course** | *Mandatory* |
| **Level of Course** | 3rd year |
| **Hours per Week** | **Lecture:** 3 | **Laboratory:** 2 | **Recitation:**  | **Practical:**  | **Studio:** | **Other:** *Field Work* |
| **ECTS Credit** | *7* |
| **Grading Mode** | *Letter Grade* |
| **Pre-requisites** | *IE 211* |
| **Co-requisites** | *-* |
| **Registration Restriction** | *-* |
| **Educational Objective** | *• Introduce the simulation concepts* *• Introduce the Arena simulation software* *• Design simulation models* *• Design simulation studies* *• Collect and analyze input data* *• Analyze simulation outputs* *• Apply simulation concepts to a real-world problem through a project*  |
| **Course Description** | *Simulation of complex discrete-event systems with applications in industrial and service organizations is the focus of this course. Course topics include modeling and programming simulations in one or more high-level computer packages; input distribution modeling; generating random numbers; statistical analysis of simulation output data.*  |
| **Learning Outcomes**  | **LO1** | *1. Understand the definition of simulation and how to develop and analyze a simulation model* *2. Understand the fundamental logic, structure, components and management of simulation modeling* *3. Demonstrate knowledge of how to use Arena* *4. Build a simulation model with basic operations and inputs* *5. Build a simulation model with detailed operations* *6. Perform statistical analysis of output from terminating simulation* |
| **LO2** |
| **LO3** |
| **LO4** |
| **LO5** |
| **LO6** |
| **n..** |
| **PART II ( Faculty Board Approval)** |
| **Basic Outcomes (University-wide)** | **No.** | **Program Outcomes** | **LO1** | **LO2** | **LO3** | **LO4** | **LO5** | **LO6** |
| **PO1** | **Ability** to communicate effectively and write and present a report in Turkish and English.  | 🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸 |
| **PO2** | **Ability** to work individually, and in intra-disciplinary and multi-disciplinary teams. |
| **PO3** | **Recognition** of the need for life-long learning and **ability** to access information, follow developments in science and technology, and continually reinvent oneself. |
| **PO4** | **Knowledge** of project management, risk management, innovation and change management, entrepreneurship, and sustainable development. |
| **PO5** | **Awareness** of sectors and **ability** to prepare a business plan. |
| **PO6** | **Understanding** of professional and ethical responsibility and **demonstrating** ethical behavior. |
| **Faculty Specific Outcomes** | **PO7** | Ability to develop, select and use modern techniques and tools necessary for engineering applications and ability to use information technologies effectively. |
| **PO8** | Recognition of the effects of engineering applications on health, environment and safety in the universal and societal dimensions and the problems of the time and awareness of the legal consequences of engineering solutions. |
| **PO9** | Ability to identify, define, formulate and solve complex engineering problems; and electing and applying appropriate analysis and modeling methods for this purpose. |
| **Discipline Specific Outcomes (program)** | **PO10** | Sufficient knowledge in mathematics, science and Industrial engineering; and the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. |
| **PO11** | Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions of economic, environmental, sustainability, manufacturability, ethics, health, safety, social and political issues; and the ability to apply modern design methods for this purpose. |
| **PO12** | Ability to design systems, conduct experiments, collect data, analyze and interpret results for the examination of Industrial engineering problems. |
| **Specialization Specific Outcomes** | **PO N….** | Ability to simulate a given real life problem and analyze the real problem using the simulation and recommend solutions to the real life problem |
| **PART III ( Department Board Approval)** |
| **Course Subjects, Contribution of Course Subjects to Learning Outcomes, and Methods for Assessing Learning of Course Subjects** | **Subjects** | **Week** |  | **LO1** | **LO2** | **LO3** | **LO4** | **LO5** | **LO6** |
| **S1** | *1* | *Introduction, What is Simulation?* | *A1, A3, A4, A5, A6* |
| **S2** | *2* | *Refresher on Probability & Statistics* | *A1, A3, A4, A5, A6* |
| **S3** | *3* | *Fundamental Simulation Concepts* | *A1, A3, A4, A5, A6* |
| **S4** | *4* | *Building a Model in ARENA* | *A1, A3, A4, A5, A6* |
| **S5** | *5* | *Building a Model in ARENA* | *A1, A3, A4, A5, A6* |
| **S6** | *6* | *Basic Operations and Inputs* | *A1, A3, A4, A5, A6* |
| **S7** | *7* | *Input Analysis* | *A1, A3, A4, A5, A6* |
| **S8** | *8* | *Modelling Detailed Operations,* | *A1, A3, A4, A5, A6* |
| **S9** | *9* | *Statistical Analysis of Output* | *A1, A3, A4, A5, A6* |
| **S10** | *10* | *Steady State Statistical Analysis* | *A1, A3, A4, A5, A6* |
| **S11** | *11* | *Entity Transfer* | *A1, A3, A4, A5, A6* |
|  | **S12** | *12* | *Continuous Models* | *A1, A3, A4, A5, A6* |
|  | **S13** | *13* | *Project Presentations* |  *A4, A5, A6* |
|  | **S14** | *14* | *Project Presentations* |  *A4, A5, A6* |
| **Assessment Methods, Weight in Course Grade, Implementation and Make-Up Rules**  | **No.** | **Type** | **Weight** | **Implementation Rule** | **Make-Up Rule** |
| **A1** | **Exam** | *20% Midterm, 20% Final* | *In class Exam* | *If a student misses an exam and provides an acceptable legitimate document, a make-up exam should be provided for the midterm.* |
| **A2** | **Quiz** |  |  |  |
| **A3** | **Homework** | *20%* | *Take Home* | *50% deduction of points due to late submission* |
| **A4** | **Project** |  |  |  |
| **A5** | **Report** | 20% | *Take Home* | *50% deduction of points due to late submission* |
| **A6** | **Presentation** | 10% | *In class* | *50% deduction of points due to late presentation* |
| **A7** | **Attendance/ Interaction** | 5% | *In class* | *Late comers are not accepted to the class* |
| **A8** | **Class/Lab./****Field Work** | 5% | *In the lab* | *Late comers are not accepted to the lab* |
| **A9** | **Other** |  |  |  |
| **TOTAL** | **100%** |
| **Evidence of Achievement of Learning Outcomes** | *Letter grades depend on the weighted total of the* *scores attained from homework, midterm, final,* *lab work, project according to the weights given above.* |
| **Method for Determining Letter Grade** | *Best Result of a Curve in class or the Catalog System given below:**A+:100 A: 95-99 A-: 90-94**B+: 85-89 B: 80-84 B-: 75-79**C+: 70-74 C: 65-69 C-: 60-64**D+: 55-59 D: 50-54 F:0-50* |
| **Teaching Methods, Student Work Load** | **No** | **Method** | **Explanation** | **Hours** |
| ***Time applied by instructor*** |
| **1** | **Lecture** | *Lecturing and utilizing chalkboard/whiteboard. Sample questions and answers to strengthen learning. In class exams.*  | *14 weeks 3 hours =42* |
| **2** | **Interactive Lecture** | *The instructor stops and asks students questions and encourages them to answer.* |  |
| **3** | **Recitation** | *Problems and solutions are demonstrated on chalkboard/whiteboard.*  |  |
| **4** | **Laboratory** | *Conducting experiments in lab and writing reports.* | *14 weeks 2 hours =28* |
| **5** | **Practical** | *Supervised practical experience in a student’s field of study that provides him/her the opportunity to apply knowledge gained in an academic setting.* | *14 weeks 1 hour =14* |
| **6** | **Field Work** | *Students out into the real world to experience new information.*  | *5 weeks 2 hours =10* |
| ***Time expected to be allocated by student*** |
| **7** | **Project** | The problem subject of the project is researched and a report is written.  | *14 weeks 2 hours =28* |
| **8** | **Homework** | Answers of given questions are prepared at home.  | *14 weeks 2 hours =28* |
| **9** | **Pre-class Learning of Course Material**  | New subjects are learned by watching videos or reading course notes before class.  | *14 weeks 1 hour =14* |
| **10** | **Review of Course Material** | Review of the subjects before exams in order to prepare.  | *14 weeks 1 hour =14* |
| **11** | **Studio** | Activity leading to skill development of the student’s design or performance ability and/or artistic growth. |  |
| **12** | **Office Hour** | Asking questions to instructor or to the teaching assistant out of class hour. |  |
| **TOTAL** | *180* |
| ***IV. PART*** |
| **Instructor** | **Name** | *Dr. Semail Ülgen* |
| **E-mail** | *sulgen@antalya.edu.tr* |
| **Phone Number** | *0242 2452307* |
| **Office Number** | *A1-33* |
| **Office Hours** | *2 hrs per week* |
| **Course Materials** | **Mandatory** | ***Simulation with Arena****, 6th edition. McGraw-Hill, by Kelton, Sadowski & Zupick (2015). (ISBN-10: 1308708882, ISBN-13:9781308708881)*  |
| **Recommended** | [***Simulation Modeling and Arena****, 2nd Edition*](http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1118607910.html) *by Manuel D. Rossetti July 2015, Wiley: (ISBN: 978-1-118-60791-6)* |
| **Other** | **Scholastic Honesty** | *Violations of scholastic honesty include, but are not limited to cheating, plagiarizing, fabricating information or citations, facilitating acts of dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Any form of scholastic dishonesty is a serious academic violation and will result in a disciplinary action.* |
| **Students with Disabilities** | *Reasonable accommodations will be made for students with verifiable disabilities.* |
| **Safety Issues**  | *The course does not require any special safety precautions.* |
|  | *Circumstances may arise during the course that prevents the instructor from fulfilling each and every component of this syllabus; therefore, the syllabus is subject to change.  Students will be notified prior to any changes.* |
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