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|  | **ECTS Course Description Form** |
| **PART I ( Senate Approval)** |
| **Offering School**  | Engineering |
| **Offering Department** | Computer Engineering |
| **Program(s) Offered to** | Computer Engineering |  |
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| **Course Code**  | CS 362 |
| **Course Name** | Operating Systems |
| **Language of Instruction** | English |
| **Type of Course** | Lecture  |
| **Level of Course** | Undergrad |
| **Hours per Week** | **Lecture: 3** | **Laboratory:** | **Recitation:**  | **Practical:**  | **Studio:** | **Other:** |
| **ECTS Credit** | **6** |
| **Grading Mode** | Letter grade |
| **Pre-requisites** | CS 102 |
| **Co-requisites** | **-** |
| **Registration Restriction** | - |
| **Educational Objective** | This course teaches the students standard operating systems structures. The students are exposed to topics such as concurrency and real-time considerations. The course discusses how common operating systems such as Unix and Windows are designed and implemented. |
| **Course Description** | This course spans the following topics: processes, threads, inter-process communication, synchronization (critical regions, semaphores, mutex, deadlocks), scheduling, memory management, i/o systems, file systems. |
|  | **LO1:** Be able to explain what an operating system and the role is it different parts of the system play |  |
| **Learning Outcomes**  | **LO2:** Be able to explain the structure of operating systems, applications, and the relationship between them. |  |
| **LO3**: Be able to explain and make use of the services provided by operating systems  |
| **LO4:** Exposure to details of major OS concepts |
| **LO5**: Write programs (Implement) various parts of operating systems.  |
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| **PART II (Faculty Board Approval)** |

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| **Basic Outcomes (University-wide)** | **No.** | **Program Outcomes** | **LO1** | **LO2** | **LO3** | **LO4** | **LO5** |  |
| **PO1** | **Ability** to communicate effectively and write and present a report in Turkish and English. | 3 | 3 | 0 | 0 | 0 |  |
|  | **PO2** | **Ability** to work individually, and in intra- disciplinary and multi-disciplinary teams. | 0 | 0 | 0 | 0 | 2 |  |
| **PO3** | **Recognition** of the need for life-long learning and **ability** to access information, follow developments in science and technology, andcontinually reinvent oneself. | 0 | 0 | 0 | 0 | 0 |  |
| **PO4** | **Knowledge** of project management, risk management, innovation and change management,entrepreneurship, and sustainable development. | 0 | 0 | 0 | 0 | 3 |  |
| **PO5** | **Awareness** of sectors and **ability** to prepare a business plan. | 0 | 0 | 0 | 0 | 0 |  |
| **PO6** | **Understanding** of professional and ethical responsibility and **demonstrating** ethicalbehaviour. | 0 | 0 | 0 | 0 | 1 |  |
| **Faculty Specific Outcomes** | **PO7** | **Ability** to define complex engineeringproblems, develop models andimplement solutions for theseproblems | 1 | 2 | 0 | 0 | 2 |  |
| **PO8** | **Ability** to conduct lab experiments by usingcomputers and the ability of collecting, analysing and interpreting data.  | 0 | 2 | 0 | 0 | 2 |  |
| **PO9** | **Ability** to apply the knowledge ofmathematics, science and engineeringprinciples to solve problems in computerengineering. | 0 | 2 | 2 | 0 | 2 |  |
| **PO10** | An **understanding** of current contemporaryissues and impact of engineering solutionsin legal and ethical levels | 0 | 0 | 0 | 0 | 0 |  |
| **PO11** | **Ability** to understand and apply discretemathematics concepts. | 0 | 0 | 0 | 0 | 0 |  |
| **PO12** | **Ability** to use modern engineeringtechniques, tools and informationtechnologies and develop softwareequipment and software. | 0 | 0 | 0 | 2 | 3 |  |
| **PO13** | **Ability** to analyse, design and manage thehardware/software computer systemrequirements with limited resources andconditions by modern engineeringprinciples. | 0 | 0 | 2 | 2 | 3 |  |

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| **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 | OS Overview | A1/3 |  |  |  |  |  |
| **S2** | 2 | Processes, Description and Control | A1/3 |  |  |  | A1/3 | A1/3 |
| **S3** | 3 | Threads, SMP, Microkernels | A1/3/8 |  |  |  |  |  |
| **S4** | 4 | Concurrency: Mutual Exclusion, Sync | A1/3 |  |  |  |  |  |
| **S5** | 5 | Concurrency: Deadlocks, Starvation |  | A1/3 | A1/3 | A1/3 |  |  |
| **S6** | 6 | Memory Management |  | A1/3 | A1/3 | A1/3 |  |  |
| **S7** | 7 | Virtual Memory |  | A1/3 | A1/3 | A1/3 |  |  |
| **S8** | 8 | Uniprocessor Scheduling | A1/3 |  |  | A1/3 | A1/3 | A1/3 |
| **S9** | 9 | Real-Time Scheduling | A1/3 |  | A1/3 | A1/3 | A1/3 | A1/3 |
| **S10** | 10,11 | I/O Management, Disk Scheduling | A1/3 | A1/3 |  | A1/3 |  | A1/3 |
| **S11** | 12,13 | File Management  | A1/3 | A1/3 |  | A1/3 |  | A1/3 |
|  |  |  |  |  |  |  |  |  |  |
| **Assessment Methods, Weight in Course Grade, Implementation and Make-Up Rules**  | **No.** | **Type** | **Weight** | **Implementation Rule** | **Make-Up Rule** |
| **A1** | **Exam** | *60%* | *Midterm is 25% and final is 35% of the final mark.* | A make-up exam is provided in case of a legitimate reason with a proof. |
| **A2** | **Quiz** | *0%* |  |  |
| **A3** | **Homework** | *25%* | *At least four assignments are submitted.* | No make-up |
| **A4** | **Project** | *15%* | Two programming projects  | Both projects are mandatory |
| **A5** | **Report** |  | - | - |
| **A6** | **Presentation** |  | - | - |
| **A7** | **Attendance/ Interaction** |  | - | - |
| **A8** | **Class/Lab./****Field Work** |  | - | - |
| **A9** | **Other** |  | - | - |
| **TOTAL** | **100%** |
| **Evidence of Achievement of Learning Outcomes** | Students will demonstrate learning outcomes through midterm exams, homework assignments, and the final exam. Every topic is tested with at least one exam or homework question. In order to pass, a student needs to accumulate at least 50 % of the total mark. |
| **Method for Determining Letter Grade** | The total mark is converted to a letter grade using the table below.

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| **Total points** | 100-95 | 94-90 | 89-85 | 84-80 | 79-75 | 74-70 | 69-65 | 64-60 | 59-55 | 54-50 |
| **Letter Grade** | A | A- | B+ | B | B- | C+ | C | C- | D+ | D |

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| **Teaching Methods, Student Work Load** | **No** | **Method** | **Explanation** | **Hours** |
| ***Time applied by instructor*** |
| **1** | **Lecture** | Lectures are given using the white board with the help of PowerPoint slides. Whenever necessary, numerical examples and sample questions are given to clarify theoretical concepts.  | 3X14 = 42 |
| **2** | **Interactive Lecture** |  |  |
| **3** | **Recitation** |  |  |
| **4** | **Laboratory** |  |  |
| **5** | **Practical** |  |  |
| **6** | **Field Work** |  |  |
| ***Time expected to be allocated by student*** |
| **7** | **Project** | Two programming assignments.  | 11\*2=22 |
| **8** | **Homework** | The students get the solution to homework questions after submission. |  4\*4 = 16 |
| **9** | **Pre-class Learning of Course Material**  |  |  |
| **10** | **Review of Course Material** | Review is conducted at the end of every chapter or module. Students are asked to be ready for review sessions. | 6\*12 = 72 |
| **11** | **Studio** |  |  |
| **12** | **Office Hour** | One hour per week is allocated for students’ questions. In addition, students can arrange for a meeting at any time. | 2\*14 = 28 |
| **TOTAL** |  *180* |
| **IV. PART** |
| **Instructor** | **Name** | Tarek Khalifa |
| **E-mail** | Tarek.khalifa@antalya.edu.tr |
| **Phone Number** | *05530557399* |
| **Office Number** | *A1-68* |
| **Office Hours** | *TBA* |
| **Course Materials** | **Mandatory** | * Computer Organization and Architecture, 9th Edition, *William Stallings,* Pearson

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| **Recommended** | * Computer Organization and Design, 4th Edition, John L. Hennessy, David A. Patterson, Morgan Kaufmann
 |
| **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, havingunauthorized possession of examinations, submitting work of another person or workpreviously used without informing the instructor or tampering with the academic work of other students. Any for 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**  | - |
| **Flexibility** | The level of detail can be made more in-depth or can be reduced depending on the students interests and time availability. |