Syllabus " **System Programming** "

Software Engineering Department

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|  | | | Course Name |
| **3503820** | | | Course No. |
| erankfmn@gmail.com | Dr. Eran Kaufman | | Lecturers’ Name |
| Ahmad Abu Hussain | | | Teaching Assistant |
| תשפ"ג | | 2022-2023 | Year |
| 3 | | | Weekly Hours |
| 3 credit points | | | Credits |
| Prog. 3 3502862  Introduction to Algorithms 3502811 | | | Prerequisite |

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| **Course Summary** |
| UNIX is an operating system that was born in 1969 at Bell labs. The design of  the UNIX operating system inspired many operating systems, e.g., Linux. This  course focuses on the GNU/Linux operating system. The students will get  familiar with the programming interface and the internals of the operating-system. |

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| Learning Methods | The course includes both theoretical lectures and practical labs and HW. |

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| **Learning Outcomes** |
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| Will have a basic understanding of the program development  process in a UNIX based system – processes, file I/O, threads,  signals, file permissions, etc. |
| Will have improved engineering and programming skills in UNIX  based environments. |
| Will have a deep understanding of the underlying  mechanisms of the interface (e.g. system calls) between an  application and the kernel. |
| Will learn the basic bash scripting and bash commands |
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| **Course Requirements and Grading** | | | |
| Submit labs at least 7, final project, pass the quiz. | | | Course Requirements |
| Can miss out 1 assignment apart from the final one. | 20% | Assignments | Grading |
|  | 80% | Final Project |

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| Mandatory. According to Shenkar's regulations | Class Attendance |

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| **Course Plan- List of Topics** | | |
|  | Topic | Reading/Assignment |
| 1 | Bash file system IO |  |
| 2 | Basic Bash scripting | Assignment A |
| 3 | Pipes and redirects |  |
| 4 | Regular expressions grep and sed | Assignment B |
| 5 | “Magic” operations find, sort, cut, tr, wc |  |
| 6 | Introduction-Historical introduction to UNIX, a quick tour, basic programming in a UNIX-based system | Assignment C |
| 7 | File I/O - Buffered/Unbuffered I/O, File Sharing, File Control. |  |
| 8 | Multithreaded programing | Assignment D |
| 9 | Socket Programming - Socket network IPC interface, TCP/IP  sockets. |  |
| 10 | Advanced I/O - Blocking/Non-blocking I/O, I/O multiplexing,  memory mapped I/O. | Assignment E |
| 11 | Processes - Process concepts and identification, process creationand termination, race conditions. |  |
| 12 | Threads - Thread concepts and identification, thread creation and termination, thread synchronization. | Final Assignment |
| 13 | IPC – interprocess communication |
| 14 | review |  |

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| **Bibliography** |
| Advanced Programming in the UNIX Environment – Second Edition / W. Richard Setevens, Stephen A. Rago |
| Linux System Programming / Robert Love |
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