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| **CMSE 474 Performance Analysis of Computer Systems and Networks** |
| **Department:** Computer Engineering |
| **Instructor Information:****Name:** Prof. Dr. Dogu Arifler**E-mail:** dogu.arifler@emu.edu.tr**Office:** CMPE 218**Office Tel:** 1192   |
| **Assistant Information:**TBA |
| **Meeting Times and Places:**Wednesdays 12:30-14:30, Room CMPE 128 Thursdays 10:30-12:30, Room CMPE 128Fridays 14:30-16:30, Room CMPE 137 (Recitation Sessions) |
| **Program Name:** Software Engineering | **Program** **Code:** 29 |
| **Course Code:** CMSE 474 | **Credits:** 4 | **Year/Semester:**2019-2020 Spring |
| [ ]  Required Course [x]  Elective Course (click on and check the appropriate box)  |
| **Prerequisite(s):** MATH 322 Probability and Statistical Methods |
| **Catalog Description**: Queueing models of computer systems and applications of queueing theory to computer modelling. Bounds on system performance. Mean-value analysis of computer systems. Modelling specific subsystems. Queueing models foranalysis. Limitations of queueing models. Analysis of transaction processors, terminal-oriented systems, and batch processing. |
| **Course Web Page:** https://staff.emu.edu.tr/doguarifler/en/teaching/cmse474 |
| **Textbook(s):** Raj Jain, *The Art of Computer Systems Performance Analysis: Techniques for Experimental Design, Measurement, Simulation, and Modeling*, Wiley, 1991. |
| **Indicative Basic Reading List:**D. A. Menascé, V. Almeida, and Larry W. Dowdy, *Performance by Design: Computer Capacity Planning by Example*, Prentice Hall, 2004.E. Lazowska, J. Zahorjan, G. Graham, and K. Sevcik, *Quantitative System Performance: Computer System**Analysis Using Queueing Network Models*, Prentice Hall, 1984. |
| **Topics Covered and Class Schedule:****(4 hours of lectures per week)**

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| **Week 1** | Overview of performance evaluation of computer systems |
| **Week 2**  | Evaluation techniques: analytical modeling, simulation, and measurement;performance metrics |
| **Week 3** | Workloads: selection and characterization |
| **Week 4** | Monitors, benchmarking, capacity planning, data presentation |
| **Weeks 5-6** | Probability and statistics for performance analysis |
| **Week 7** | Comparing systems, confidence intervals |
| **Weeks 8-9** | *MIDTERMS* |
| **Weeks 10-11** | Queueing theory, analysis of a single queue |
| **Week 12**  | Queueing networks |
| **Week 13** | Operational laws |
| **Week 14** | Mean-value analysis |

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| **Recitation Session Schedule:***Please refer to the course Web site for assigned problems.** Session 1: March 13: Review of probability and statistics
* Session 2: March 20: Probability and statistics problem set
* Session 3: April 3: Comparing systems and confidence intervals problem set
* Session 4: May 8: Queueing theory problem set
* Session 5: May 15: Queueing networks problem set
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| **Course Learning Outcomes:** Upon successful completion of the course, students are expected to have the following competencies:1. Use applied probability theory in measuring the performance of a system.
2. Formulate statistics and data presentation.
3. Practice performance evaluation techniques and performance measures or metrics.
4. Measure the capacity of a system component.
5. Summarize and analyze experiments outcomes.
6. Compare systems using sample data.
7. Use queuing theory to measure performances of systems.
8. Analyze single queue systems.
9. Analyze simple queuing networks.
10. Model communication networks and I/O computer systems
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| **Assessment** | **Method** | **No** | **Percentage** |
| Midterm Exam | 1 | 40% |
| Final Exam | 1 | 50% |
| Recitation Sessions | 5 | 10% |
| **Attendance and Participation:** Attendance to every lecture is mandatory. |
| **NG Policy:** Receiving zero from or missing any of the components (midterm, final) used in determination of the letter grade or attending <50% of the lectures may result in an NG if the accumulated total mark in the course is <50%. |
| **Make-Up Policy:** Only one **comprehensive** make-up examination will be given for a missed midterm or final **only under exceptional/extenuating circumstances** (e.g., hospitalization, loss of a close relative, etc.). In these cases, students must submit a petition with related official reports to me within the next three working days following the missed exam. Note that minor ailments are not considered as exceptional/extenuating circumstances. Eligibility to take the make-up exam **will be subject to my final approval.** |
| **Academic Dishonesty:** Any conduct that attempts to gain unfair academic advantage is considered academic dishonesty. Copying labs and assignments, cheating during exams, substituting for another person are some examples of academic dishonesty. Cases of academic dishonesty will not be tolerated and will be punished according to EMU's disciplinary policies. |
| **Relationship of the course to Student Outcomes**The course has been designed to contribute to the following student outcomes:1. (1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. (6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
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| **Prepared by:** Prof. Dr. Dogu Arifler | **Date Prepared:** 15 February 2020 |