ECTS COURSE INFORMATION FORM

Faculty	**Faculty of Engineering**	
	B.Sc. in Civil Engineering	**Elective**
	B.Sc. in Computer Engineering	**Elective**
	B.Sc. in Electrical-Electronics Engineering	**Elective**
	B.Sc. in Industrial Engineering	**Elective**
	B.Sc. in Mechanical Engineering	**Elective**

Course Code	COMP 472			
Course Title in English	Parallel & Distributed Systems			
Course Title in Turkish	Paralel ve Dağıtık Sistemler			
Language of Instruction	English			
Type of Course	Flipped Classroom			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	10	30	60	-
Semester Offered	Fall			
Contact Hours per Week	Lecture:3 hours	Recitation:-	Lab:-	Other:-
Estimated Student Workload	146 hours			
Number of Credits	5 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	N/A			
Expected Prior Knowledge	Introduction to Programming (basic C and Python), Basic understanding of Computer Architecture.			
Co-requisites	None			
Registration Restrictions	Senior Undergraduate Students/Junior Graduate Students			
Overall Educational Objective	To learn about the fundamentals of parallel and distributed systems, data processing and storage technologies.			
Course Description	In this course, we will cover a list of introductory materials about distributed and parallel systems including computation and storage aspects of data. We will learn fundamentals of multi-core, multi-thread as well as multi-computer programming models such as MP and MPI, service models, networking, distributed/parallel file systems, and various distributed system algorithms related to lookup, concurrency, consistency, availability and failure tolerance. We will also cover common problems of distributed systems such as livelocks and deadlocks and try to investigate some of the modern solutions. If time permits, we will also give time to learn advanced topics such as cloud computing and cloud storage concepts.			
Course Description in Turkish	Bu ders parallel ve dagitik sistemlere temel olacak iceriklere giris yaparak veri depolamasi ve islenmesi gibi konulari kapsayacaktir. Coklu-cekirdek, coklu-dizin ve coklu-bilgisayar ortamlari icin parallel islem yapan acik kaynak standardlara (MP ve MPI) uygulama icin kullanilacak, servis modelleri, aglar, dagitik dosyalama sistemleri, ve eszamanlilik, tutarlilik, kullanilabilirlik ve hataya karsi musamaha gibi fikirler etrafinda incelenecektir. Ayni zamanda parallel sistemler için genel problemler tartisilacak (livelock ve deadlock gibi) ve bunlara çözum onerileri sunulacaktir. Eger zaman izin verirse, bulut hesaplama ve depolama uzerinde durulacaktir.			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to: 1. describe the fundamentals of networking; 2. design and implement concepts of distributed systems; 3. apply the basics of parallel computing; 4. identify and use proper open source programming models to solve common problems; 5. explain the advanced cloud/fog system concepts.			

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Student Outcomes	N=None S=Supportive H=High		Exam, Project, HW, Experiment, Presentation, etc.
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	H	1,2	Exam, HW
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	H	3,4	Exam, HW
(3) an ability to communicate effectively with a range of audiences			
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	H	5	Project
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions			
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies			

Prepared by and Date	Assoc. Prof. Dr. Şuayb Ş. Arslan / Sept. 2019	
Semester	Fall 2019-2020	
Name of Instructor	Assoc. Prof. Dr. Şuayb Ş. Arslan	
Course Contents	Week	Topic
	1.	Introduction to Distributed and Parallel Systems
	2.	Basics of Computer Networks
	3.	Networking: Socket programming
	4.	Remote Procedure Calls
	5.	Clocks, Clock Synchronization
	6.	Load Balancing
	7.	Consensus: Paxos & Raft
	8.	Concurrency and deadlocks
	9.	openMP: Fundamentals
	10.	openMP: Application development
	11.	openMPI: Fundamentals
	12.	openMPI: Application development
	13.	Hash Tables, Consistent Hashing
	14.	Distributed file systems and clustering
	15.	Final Exam/Project/Presentation
	16.	Final Exam/Project/Presentation
Required/Recommended Readings	*Distributed Systems: Principles and Paradigms,* Andrew S. Tanenbaum, Maarten Van Steen, Pearson, 2nd Edition, 2016. ISBN-13: 978-0132392273	
Teaching Methods	Lectures/contact hours using 'flipped classroom'	
Homework and Projects	4 Homework and 1 project. Homework can include short implementations for use in the project	
Laboratory Work	N/A	
Computer Use	Required	

Other Activities	Report writing for the project.
Assessment Methods	Types of assessment — Number — Ratio (%) Midterm Exam — 1 — 26 Project — 1 — 30 Homework — 4 — 44 (each contributing 11%) Total — 100
Course Administration	**Instructor's office and phone number, office hours, email address:** - Office: 5th Floor, right across the entrance. - Phone number: 0212 395 3735 - Email address: arslans@mef.edu.tr **Rules for attendance, late submissions, missing an exam, etc.:** Attendance is not enforced by any means and yet it is highly encouraged for getting a successful letter grade. Late submissions may end up in 5 points penalty for each day past the deadline. Provided that proper documents are presented, each missed midterm by the student will be given the grade of the final exam. No make-up exam shall be given. **A reminder of proper classroom behavior, code of student conduct:** YÖK regulations. **Statement on plagiarism:** Plagiarism or any type of ethical misconduct shall not be tolerated. For more information, please see the corresponding YÖK regulations.

ECTS Student Workload Estimation

Activity	No/Weeks	Hours			Calculation	Explanation
	No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
Lecture/Flipped Classroom	14	2	2.5	0	63	A*(B+C+D)
Midterm(s)	1	20	2	0	22	A*(B+C+D)
Labs						
Term Project	1	30	3	0	33	A*(B+C+D)
HWs	4	5	2	0	28	A*(B+C+D)
Final Examination						A*(B+C+D)
Total Workload					146	
Total Workload/25					5.84	
ECTS					**5**	