MEF UNIVERSITY

COURSE INFORMATION FORM

School/Faculty/Institute	**Faculty of Engineering**	
	B.Sc. in Computer Engineering	**Elective**
	B.Sc. in Electrical-Electronics Engineering	**Elective**
Semester	**Fall 2017-2018**	

Course Code	COMP472			
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
	25	40	30	5
Semester	Fall			
Contact Hours per Week	Lecture: 3	Recitation:	Lab:	Other:
Estimated Student Workload	137 hours per semester.			
Number of Credits	5 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	N/A			
Expected Prior Knowledge	Introduction to Programming (basic C + Python), Computer Architecture.			
Co-requisites	None			
Registration Restrictions	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 deadlocks and try to give 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 icin genel problemler tartisilacak (deadlock gibi) bunlara cozum onerileri sunulacaktir. Eger zaman izin verirse, bulut hesaplama ve depolama uzerinde durulacaktir.			
Course Learning Outcomes and Competences	Upon successful completion of the course, the student should be able to: 1. Learn about the fundamentals of networking 2. Master, design and implement concepts of distributed systems 3. Understand and apply the basics of parallel computing 4. Identify and use proper open source programming models to solve common problems			

	5. Get familiar with the advanced cloud system concepts

Relation to Program Outcomes and Competences: N=None S=Supportive H=Highly Related

Program Outcomes and Competences	Level	Assessed by
	N/S/H	Exams, HW, etc.
(a) an ability to apply knowledge of mathematics, science, and engineering	H (1,2,3,4,5)	Exams, Quizes, HW
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	N	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H (2,3,4)	HWs
(d) an ability to function on multidisciplinary teams	N	
(e) an ability to identify, formulate, and solve computer engineering problems	H (2,3,4)	Exams, Quizes, HWs
(f) an understanding of professional and ethical responsibility	S	Exams, HWs
(g) an ability to communicate effectively	N	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	N	
(j) a knowledge of contemporary issues	S	HWs
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer engineering practice.	S	Exams, Quizes, HWs

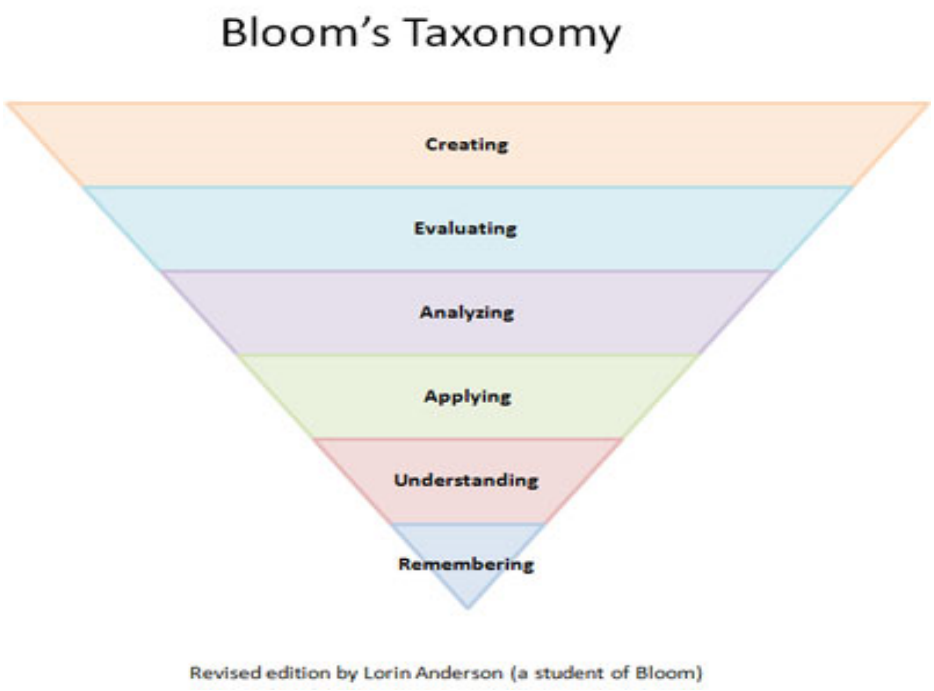
Prepared by and date	Assoc. Prof. Suayb S. Arslan / January 2017	
Name of Instructor	Assoc. Prof. Suayb S. Arslan	
Course Contents	Week	Topic
	1.	Introduction to Distributed and Parallel Systems
	2.	Networking: Socket programming I
	3.	Networking: Socket programming II
	4.	Remote Procedure Calls
	5.	Clock Synchronization
	6.	Load Balancing
	7.	Consensus: Paxos
	8.	Concurrency and deadlocks
	9.	openMP: Fundamentals
	10.	openMP: Application development
	11.	openMPI: Fundamentals
	12.	openMPI: Application development
	13.	Hash Tables
	14.	Distributed File systems and clustering
	15.	Final Examination Period
	16.	Final Examination Period
Required/Recommended Readings	No textbook required. Instructor will be assigning reading materials on a periodic basis.	
Teaching Methods	Lectures/contact hours using ‘flipped classroom’ as an active learning technique.	

Homework and Projects	Four Homeworks: Homeworks can include short projects/implementations.
Laboratory Work	N/A.
Computer Use	Required.
Other Activities	None
Assessment Methods	Types of assessment : Midterm Exams — Number 2 — Ratio (%) 40 (each contributing 20%) Quizes/in-class exercises — 5 — 20 (each contributing 4%) Homeworks — 4 — 40 (each contributing 10%) Total — 100
Course Administration	Şuayb Ş. Arslan E-mail: arslans@mef.edu.tr Phone: +90 545 9050974/ +90 212 395 3735. Office Hours: Tuesday 10:20am -11:40am

ECTS Student Workload Estimation

Activity	No/Weeks	Hours			Calculation	Expla
	No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
Lecture	14	2	2.5		63	A*(B-
Midterm(s)	2	4	2		12	A*(B-
Assingment	4	14	1.5		62	A*(B-
Total Workload					137	
Total Workload/25					5.48	
ECTS					**5**	

Key verbs for cognitive domain in writing learning outcomes and competences:



Key Verbs:

Remembering: defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states.
Understanding: comprehends, converts, defends, distinguishes, estimates, explains, extends, generalizes, gives an example, infers, interprets, paraphrases, predicts, rewrites, summarizes, and translates.
Applying: applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.
Analyzing: analyzes, breaks down, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates.
Evaluating: appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports.
Creating: categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes.

Key verbs for affective domain in writing learning outcomes and competences:

Receiving Phenomena: asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits, erects, replies, uses.
Responding to Phenomena: answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes.
Valuing: completes, demonstrates, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works.
Organizing: adheres, alters, arranges, combines, compares, completes, defends, explains, formulates, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes.
Internalizing values: acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, verifies.