Distributed Computing       None         Language of the Courses       None         Language of the Course       English         Course Level       Undergraduate         Type of Course       Optional         Course Assistants       Instructors         Course Coordinator       Algorithm development and implementation for parallel and distributed systems acquisition of skills         Course Content       Rationale, parallel architectures, parallel algorithm design, message delivery programming, shared memory programming, performance analysis, MPI and OPENMP, example problems.         Course Learning Outcomes       I. To be able to use a parallel programming library to write and run para programs         OUTOMP, example problems.       I. To be able to use a parallel programming theoret to distribute communication, stacking, and matching.         3. Ability to use IDE to design, implement, debug and run parallel program         9. Chitectural structures       Introduction to distributed systems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         114       Distributed database systems         12       Distributed database systems         13       File-based systems         14       Distributed database systems are not sufficien	Course title			Code	semester	T+U	credit	ECTS				
Language of the Course         English           Course Level         Undergraduate           Type of Course         Optional           Course Coordinator         Instructors           Instructors         Algorithm development and implementation for parallel and distributed systems acquisition of skills           Course Assistants         Rationale, parallel architectures, parallel algorithm design, message delivery programming, shard memory programming, performance analysis, MPI and OPEINMP, example problems.           Course Learning Outcomes         1. To be able to use a parallel algorithms using the concepts of distribute communication, stacking, and matching.           3.         . To be able to design parallel algorithms using the concepts of distributi communication, stacking, and matching.           . To be able to design parallel algorithms using the concepts of distributi communication, stacking, and matching.           . To be able to design parallel programs           Weeks         Topics           One         Introduction to distributed systems           2         Architectural structures           3         Communication models           4         Distributed naming           5         Parallel and distributed systems           7         Logical clocks           8         Vector clocks           9         Critical zone methods in distributed systems	Distributed C	Computing			7	3+0	3	4				
Course Level         Undergraduate           Type of Course         Optional           Course Coordinator         Instructors           Instructors         Algorithm development and implementation for parallel and distributed systems acquisition of skills           Course Content         Rationale, parallel architectures, parallel algorithm design, message delivery programming, shard memory programming, performance analysis, MPI and OPENMP, example problems.           Course Learning         0.1           Outcomes         1.           0.1         To be able to use a parallel algorithm using the concepts of distributi communication, stacking, and matching.           0.1         To be able to design parallel algorithms using the concepts of distributi communication, stacking, and matching.           3.         Ability to use IDE to design, implement, debug and run parallel programs           Veeks         Topics           On         Introduction to distributed systems           2         Architectural structures           3         Communication models           4         Distributed naming           5         Parallel and distributed systems           7         Logical clocks           8         Veetor clocks           9         Critical zone methods in distributed systems           10         replication	Prerequisite Courses											
Type of Course         Optional           Course Coordinator         Instructors           Course Assistants         Algorithm development and implementation for parallel and distributed systems acquisition of skills           Course Content         Rationale, parallel architectures, parallel algorithm design, message delivery programming, shared memory programming, performance analysis, MPI and OPEINMP, example problems.           Course Learning         1. To be able to use a parallel algorithms using the concepts of distributic communication, stacking, and matching.           Outcomes         2. To be able to design parallel algorithms using the concepts of distributic communication, stacking, and matching.           Weeks         Topics           One         Introduction to distributed systems           2         Architectural structures           3         Communication models           4         Distributed naming           5         Parallel and distributed processes           6         Sync problems           7         Logical clocks           8         Vector clocks           9         Critical zone methods in distributed systems           10         replication           11th         Fault tolerance methods           12         Distributed flat systems           13         File-based systems												
Correse Coordinator         Instructors           Course Assistants         Algorithm development and implementation for parallel and distributed systems acquisition of skills           Course Context         Algorithm development and implementation for parallel and distributed systems acquisition of skills           Course Context         Rationale, parallel architectures, parallel algorithm design, message delivery programming, shared memory programming, performance analysis, MPI and OPENMP, example problems.           Course Learning Outcomes         1. To be able to use a parallel programming library to write and run para programs           2. To be able to design parallel algorithms using the concepts of distributic communication, stacking, and matching.         3. Ability to use IDE to design, implement, debug and run parallel programs           3         Communication models         4. To implement parallel programs           4         Distributed naming         5           5         Parallel and distributed systems           6         Sync problems           7         Logical clocks           8         Vector clocks           9         Critical zone methods in distributed systems           10         replication           111h         Fault olerance methods           12         Distributed file systems           13         File-based systems           14         Distribu	Course Level											
Instructors         Algorithm development and implementation for parallel and distributed systems acquisition of skills           Course Content         Rationale, parallel architectures, parallel algorithm design, message delivery programming, shared memory programming, performance analysis, MPI and OPENMP, example problems.           Course Learning Outcomes         1. To be able to use a parallel algorithm using the concepts of distributic communication, stacking, and matching.           2. To be able to design parallel algorithms using the concepts of distributic communication, stacking, and matching.         3. Ability to use IDE to design, implement, debug and run parallel program           Weeks         Topics           one         Introduction to distributed systems           2         Architectural structures           3         Communication models           4         Distributed naming           5         Parallel and distributed processes           6         Sync problems           7         Logical clocks           8         Vector clocks           9         Critical zone methods in distributed systems           10         replication           11th         Fault tolerance methods           12         Distributed database systems           13         File-based systems           14         Distributed database systems are not sufficient and by basin			Optional									
Course Assistants         Algorithm development and implementation for parallel and distributed systems acquisition of skills           Course Content         Rationale, parallel architectures, parallel algorithm design, message delivery programming, shared memory programming, performance analysis, MPI and OPENMP, example problems.           Course Learning Outcomes         1.         To be able to use a parallel programming library to write and run para programs           2.         To be able to use a parallel algorithms using the concepts of distribute communication, stacking, and matching.           3.         Ability to use IDE to design, implement, debug and run parallel programs           Veeks         Topics           one         Introduction to distributed systems           2         Architectural structures           3         Communication models           4         Distributed processes           6         Sync problems           7         Logical clocks           8         Vector clocks           9         Critical zone methods in distributed systems           13         File-based systems           14         Distributed database systems           13         File-based systems are not sufficient and by basing these solutions on theoretical foundations.           resources           General Competencies		rdinator										
The aim of lesson       Algorithm development and implementation for parallel and distributed systems acquisition of skills         Course Content       Rationale, parallel architectures, parallel algorithm design, message delivery programming, shared memory programming, performance analysis, MPI and OPENMP, example problems.         Course Learning Outcomes       1. To be able to use a parallel programming library to write and run para programs         2. To be able to use a parallel algorithms using the concepts of distribute communication, stacking, and matching.       3. Ability to use IDE to design, implement, debug and run parallel programs         Weeks       Topics         one       Introduction to distributed systems         2       Architectural structures         3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11       Fault Iderance methods         13       File-based systems         14       Distributed database systems         13       File-based systems are not sufficient and by basing these solutions on theoretical foundations.         resources	Instructors											
acquisition of skills       1       1         Course Content       Rationale, parallel architectures, parallel algorithm design, message delivery programming, shared memory programming, performance analysis, MPI and OPENMP, example problems.         Course Learning Outcomes       1. To be able to use a parallel programming library to write and run para programs         2. To be able to design parallel algorithms using the concepts of distributi communication, stacking, and matching.       3. Ablity to use IDE to design, implement, debug and run parallel program         Weeks       Topics         one       Introduction to distributed systems         2       Architectural structures         3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11hh       Fault tolerance methods         12       Distributed diabase systems         13       File-based systems         14       Distributed database systems         15       Pogrand competencies         General Competencies         Architectural sys												
programming, shared memory programming, performance analysis, MPI and OPENMP, example problems.           Outcomes         1. To be able to use a parallel programming library to write and run para programs           2. To be able to design parallel algorithms using the concepts of distribute communication, stacking, and matching.         3. Ability to use IDE to design, implement, debug and run parallel programs           Weeks         To implement parallel programs           Weeks         To implement parallel programs           One         Introduction to distributed systems           2         Architectural structures           3         Communication models           4         Distributed naming           5         Parallel and distributed processes           6         Sync problems           7         Logical clocks           8         Vector clocks           9         Critical zone methods in distributed systems           10         replication           11th         Fault tolerance methods           12         Distributed file systems           13         File-based systems           14         Distributed database systems           15         Peralle and systems are not sufficient and by basing these solutions on theoretical foundations. resources           AS Tanenbaum, M. v. Steen, Distributed Systems			Algorithm development and implementation for parallel and distributed systems acquisition of skills									
OPENMP, example problems.           1. To be able to use a parallel programming library to write and run para programs           2. To be able to design parallel algorithms using the concepts of distributi communication, stacking, and matching.           3. Ability to use IDE to design, implement, debug and run parallel programs           Weeks         To implement parallel programs           3. Ability to use IDE to design, implement, debug and run parallel programs           4. To implement parallel programs           3. Ability to use IDE to design, implement, debug and run parallel programs           4. To implement parallel programs           3. Communication models           4. Distributed naming           5           6           8           9           Critical zone methods in distributed systems           10           11th           Fault tolerance methods           12           13           714           14           15           13           14           15           14           15           16           17           18           19           10           111           12	<b>Course Cont</b>	tent										
Course Learning Outcomes         1.       To be able to use a parallel programming library to write and run para programs         2.       To be able to design parallel algorithms using the concepts of distributi communication, stacking, and matching.         3.       Ability to use IDE to design, implement, debug and run parallel programs         Weeks       To implement parallel programs         0ne       Introduction to distributed systems         2       Architectural structures         3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         111th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition												
Outcomes       programs         2       To be able to design parallel algorithms using the concepts of distributic communication, stacking, and matching.         3       Ability to use IDE to design, implement, debug and run parallel programs         Weeks       Topics         one       Introduction to distributed systems         2       Architectural structures         3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         13       File-based systems         14       Distributed database systems         resources         Asternet contributes to program competencies by teaching how to produce distributed and parallel application in eases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         Asternet contretures         Asternet con	<u>C</u>	<b>.</b>	OPENMP, exa	imple proble	ems.		·1					
2. To be able to design parallel algorithms using the concepts of distribution communication, stacking, and matching.         3. Ability to use IDE to design, implement, debug and run parallel program         Weeks       Topics         one       Introduction to distributed systems         2       Architectural structures         3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         14       Distributed systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition		ning			a parallel prog	gramming I	ibrary to writ	e and run parallel				
communication, stacking, and matching.         3 Ability to use IDE to design, implement, debug and run parallel program.         Topics         one       Introduction to distributed systems         2       Architectural structures         3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         14       Distributed systems are not sufficient and by basing these solutions on theoretical foundations.         resources         As Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition	Outcomes		1 0		gn parallel alg	orithms usi	ng the concer	ots of distribution.				
3. Ability to use IDE to design, implement, debug and run parallel programs       Weeks     To implement parallel programs       Weeks     Topics       One     Introduction to distributed systems       2     Architectural structures       3     Communication models       4     Distributed naming       5     Parallel and distributed processes       6     Sync problems       7     Logical clocks       8     Vector clocks       9     Critical zone methods in distributed systems       10     replication       11th     Fault tolerance methods       12     Distributed file systems       13     File-based systems       14     Distributed database systems       14     Distributed systems are not sufficient and by basing these solutions on theoretical foundations.       resources       As Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition												
Weeks       Topics         one       Introduction to distributed systems         2       Architectural structures         3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         As Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition							bug and run p	parallel programs				
Introduction to distributed systems         2       Architectural structures         3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations. resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition		T	4. To in	nplement par	allel programs							
2       Architectural structures         3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition	Weeks	Topics										
3       Communication models         4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition	one	Introduction to distributed systems										
4       Distributed naming         5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations. resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition	2	· · · · · · · · · · · · · · · · · · ·										
5       Parallel and distributed processes         6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition	3	Communicati										
6       Sync problems         7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition	4	Distributed na										
7       Logical clocks         8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         resources         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition	5	Parallel and d	Parallel and distributed processes									
8       Vector clocks         9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition		Sync problems										
9       Critical zone methods in distributed systems         10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition		Logical clocks										
10       replication         11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition		Vector clocks	8									
11th       Fault tolerance methods         12       Distributed file systems         13       File-based systems         14       Distributed database systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition		Critical zone	methods in distr	ibuted syste	ms							
12       Distributed file systems         13       File-based systems         14       Distributed database systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition         Evaluation System		replication										
13       File-based systems         14       Distributed database systems         14       Distributed database systems         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition         Evaluation System	11th	Fault tolerand	ce methods									
14       Distributed database systems         General Competencies         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application         in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition         Evaluation System		Distributed fi	le systems									
Distributed database systems         General Competencies         General Competencies         The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations.         resources         AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition         Evaluation System		File-based systems										
The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations. <b>resources</b> AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition <b>Evaluation System</b>	14	Distributed database systems										
The course contributes to program competencies by teaching how to produce distributed and parallel application in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations. <b>resources</b> AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition <b>Evaluation System</b>				0	•							
in cases where centralized systems are not sufficient and by basing these solutions on theoretical foundations. resources AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition Evaluation System	The	antillast s s t			-	- des c - 1° - 1°	1					
AS Tanenbaum, M. v. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition Evaluation System		1	0 1		U 1		1	11				
Evaluation System				reso	urces							
	AS Tanenbau	um, M. v. Steen	, Distributed Sys	stems: Princ	iples and Parad	ligms, Pren	tice Hall, 2nd	Edition				
The dates, days and hours of the Midterm Exam, Quiz, Final Exam and Evaluations will be announced later,				Evaluatio	on System							
according to the decision of the Faculty Administrative Board.						Evaluations	s will be anno	unced later,				

	WITH PROGRAM LEARNING OUTCOMES COURSE LEARNING OUTCOMES RELATIONSHIP TABLE											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
L01			3	2	4							
LO2			3	2		one						
L03					3	3						
LO4			3		2	4						
		1	LO:	Learning	Outcome	s OP: Prog	gram Outc	omes	1		1	
Contri bution Level	1 Very Low		2 Low		3 Media	um	4 Higl	4 High		5 Very High		

## **Relation of Program Outcomes and Related Course**

Course name	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	<b>PO7</b>	PO8	PO9	PO10	PO11
Distributed			2	2	2	2					
Computing			3	Z	3	3					