		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
		Main Focus : finish Sunday	Main Focus :	Main Focus :				
		Planning !						
		To Do h	To Do h	To Do h	To Do h	To Do h	To Do h	To Do h
	EProg	Learn exam	Code exam				Code the same exam	
	A&D Prog			Learn exam	Code exam			Code the same exam
	A&D							
W 1								
	DM							
	LA							
	Total							
	Notes							

		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
		Main Focus : finish Sunday	Main Focus :					
		Planning !						
		To Do h	To Do h	To Do h	To Do h	To Do h	To Do h	To Do h
	EProg							
	A&D Prog							
	A&D							
W 2								
2	DM							
	LA							
	Total							
	Notes							

		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
		Main Focus : finish Sunday	Main Focus :					
		Planning !						
۰.		To Do h	To Do h	To Do h	To Do h	To Do h	To Do h	To Do h
	EProg							
	A&D Prog							
	A&D							
W 3								
Ŭ	DM							
	LA							
	Total							
	Notes							

		М	londay		Tuesday		Wednesday		Thursday			Friday			Saturday		Sunday			Monday		Tuesday 21	.01
		To-Do	h	To-Do	h	To-Do	h	To-Do	ł	h	To-Do		h	To-Do	h	To-Do		h	To-Do		h	To-Do	h
	EProg																						
	A&D Prog																						
	A&D																						
																						A&D Prüfur	ng
14/																							
4	DM																						
	LA																						
								L															
	Total																						

		Wednesday 22.0	1	Thursday 23.01		Friday 24.01	
		To-Do	h	To-Do	h	To-Do	h
	EProg						
						EProg Prüfung	
	A&D Prog						
w	DM						
5							
	LA						
	Total						

		Saturday 25	5.01	Sunday 26.01		Monday 27.01		Tuesday 28.0 <sup>-</sup>	1	Wednesday 29.01	1
		To-Do	h	To-Do	h	To-Do	h	To-Do	h	To-Do	h
	A&D Prog										
	DM										
W											
6											
	LA										
										LA Prüfung	
	Total										

		Thursday 30.01		Friday 31.01		Saturday 01.02	Sunday 02.02		Monday 03.02	Tuesday 04.02	Wednesday	Thursday 06.02	
		To-Do	h	To-Do	h	To-Do h	To-Do	h	To-Do h	To-Do h	To-Do h	To-Do h	
	A&D Prog											A&D Coding Prufung	
W	DM												
7										DM Prüfung			
	Total												

## Code daily in the morning !!!

TO DO

EProg	A&D Prog	A&D	DM	LA
To-Do h	To-Do h	To-Do h	To-Do h	To-Do h
Ubung 0	Semester Exercises 1	Quizzes (Anki)	Chapter 6 - Logic	Exercises 0
Ubung 1	Semester Exercises 2		Skript reading	Exercises 1
Ubung 2	Semester Exercises 3	T1-T2 ZF	Cheat Sheet	Exercises 2
Ubung 3	Semester Exercises 4	Asymp. Notation ZF	Related Exercises	Exercises 3
Ubung 4	Semester Exercises 5	Loop Counting ZF	Short Qs exam solving	Exercises 4
Ubung 5		Induction	Proofs exam solving	Exercises 5
Ubung 6	DP Youtube Video	Searchs ZF		Exercises 6
Ubung 7	Graph Youtube Video	Sorts ZF	Chapter 3 - Set T.	Exercises 7
Ubung 8		Heap , AVL , BST	Skript reading	Exercises 8
Ubung 9	CodeEx Exams	DP	Cheat Sheet	Exercises 9
Ubung 10	2023 Winter	Graph ZF	Related Exercises	Exercises 10
Ubung 11	2023 Summer	Graph Definitions ZF	Short Qs exam solving	Exercises 11
Ubung 12	2022 Winter	Graph Searchs ZF	Proofs exam solving	Exercises 12
	2022 Summer	Shortest Path ZF		
Bonus W8	2021 Winter 1	MST ZF	Chapter 4 - Number T.	Cheat Sheet Prep
Bonus W10	2021 Winter 2		Skript reading	
	2021 Summer	Semester Exercises :	Cheat Sheet	Exam Solving !
	2020 Winter	VV1	Related Exercises	
Programming exams	2020 Summer	W2	Short Qs exam solving	
FS23	(HS19 Winter)	W3	Proofs exam solving	
HS22	(HS19 Summer)	W4		
FS22		W5	Chapter 5 - Algebra	
HS21 B		W6	Skript reading	
HS21 A			Cheat Sheet	
ES01			Polated Exercises	
		VV8	Short On axem polying	
H320		VV9	Short QS exam solving	
F520		VV TO	Proofs exam solving	
HS19		VV11		
		W12		
		W13		
Quizzes				
		Exams :		
Written Exams		HS19		
HS19		FS20		
HS20		HS20		
HS21		FS21		
HS22		HS21		
HS23		FS22		
		HS22		
		FS23		
		HS23		
		FS24		

WO	Induction	Asymp. g.						
W1	Induction	Asymp. g.						
W2	Induction	Asymp. g.						
W3		Asymp. g.	Loop c.					
W4		Asymp. g.	Loop c.	Sorts search				
W5				Sorts	Heap, AVL			
W6					AVL	Dp		
W7						Dp		
W8							Graph defs	
W9							Graph	
W10							Graph,Dijkstra	DFS,
W11							Shortest P. Storied Qs	BFS,
W12							MST	
W13	INV PROOF						Shortest Paths, Storied Qs	

HS19 FS24

Semester Exercises :

EProg Exams	
Written	Programming
HS19	HS19
HS20	FS20
HS21	HS20
HS22	FS21
HS23	HS21 a
	HS21 b
	FS22
	HS22
	FS23

## Semester Exercises WrittenThis is from last year ,<br/>do one for yourselves

Übung	Aufgabe	Торіс
U1	<b>A</b> 4	EBNF
U2	<b>A</b> 4	Postconditions
U3	A6	Weakest Precondition
U4	A4	Loop Invariante
U5	A4	EBNF
U6	A4	Loop Invariante
U7	A1	EBNF
U8	A1	Loop Invariante
U9	A5	Klassenratsel
U10	A1	Loop Invariante
U11	A5	Loop Invariante
U12	A1	Hoare Triple

FXAMS	1		2		3		4		
LANIO	Short Qs	Rest							
HS19									
FS20									
HS20									
FS21									
HS21									
FS22									
HS22									
FS23									
HS23									
FS24			1 1						

Exams	A22	<b>DP Exercise</b>	Graph Exercise	Notes (graph)
2022 Winter		Array Compression	Tree Augmentation	
2022 Summer		Left and Right	Two Trees	
2021 Winter 1	+	Shortest Uncommon Subsequence	Undirected Graph	
2021 Winter 2	+	Longest Power-of-two Subsequence	Graph Sets	
2021 Summer	+	Pair - Subsequence	Players on a Graph	
2020 Winter	+	Shuffle	Binary Tree	
2020 Summer	+	Longest Palindromic Subsequence	Undirected Graph	1. Two_Induced_Path , 2. Exists_Euler_Cycle , 3. Two_Colorable , 4. Max_Distance(v)
HS19 WINTER	+	Square	Heap	
HS19 SUMMER	+	Grid	Kruskal Algorithm	

LA			Learnning Goals
WO	Assignment	ÜS NOTES	basic vector operations (in R <sup>m</sup> ): add two vectors, multiply a vector with a scalar, compute linear combinations of two or more vectors; visualize and understand these operations geometrically
W1	Assignment 1 Quiz	ÜS NOTES	compute with vectors: scalar product, length, cosine formula, Cauchy- Schwarz inequality, triangle inequality, perpendicular vectors; define linear independence of vectors in three different ways; work with the span of vectors
W2	Assignment 2 Quız	ÜS NOTES	compute with matrices: matrix-vector multiplication, column space, row space, rank; perform matrix multiplication, including matrix- vector, vector-matrix, scalar and outer product, distributivity, associativity
W3	Assignment 3 Bonus	ÜS NOTES	explain the CR decomposition; linear transformations, visualizing linear transformations in 2d, properties of linear transformations, matrix representation of linear transformations; systems of linear equations, systems of linear equations with unique solutions
W4	Assignment 4 Quız	ÜS NOTES	do elimination and back substitution on square systems of linear equations, explain when and why this works or fails; define the inverse of a matrix, compute inverses of $2 \times 2$ matrices, characterize when the inverse exists (The Inverse Theorem), invert a product of matrices and the transpose of a matrix;
W5	Assignment 5 Quiz	ÜS NOTES	derive and explain the LU factorization from elimination; compute the REF and RREF of a given m x n matrix A, explain why it equals R in A=CR;
W6	Assignment 6 Bonus	ÜS NOTES	explain the concept of a vector space; give examples that are not R <sup>m</sup> ; define and identify subspaces; explain when vectors span a subspace / form a basis of it; prove that every basis has the same number of vectors; define the dimension of a vector space; find a basis for a given vector space / subspace;
W7	Assignment 7 Quiz	ÜS NOTES	define the nullspace of a matrix; compute a basis for the nullspace of a matrix; solve Ax=b by elimination to REF, read off all solutions, count the number of solutions; define the four fundamental subspaces of a matrix: column space, row space, nullspace, left nullspace; compute their dimensions, depending on shape and rank of the matrix; define orthogonal complement and orthogonal subspaces; prove that nullspace and row space of a matrix are orthogonal; argue about dimensions of two orthogonal
W8	Assignment 8 Quız	ÜS NOTES	Define Projection, Derive formula for Projection on a subspace, Compute the Projection Matrix. Show that when A has independent columns, A <sup>TA</sup> is invertible and symmetric. Define Least Squares solution, derive Normal equations, compute a least squares solution. Use Least Squares to fit a line to points (linear regression).
W9	Assignment 9 Bonus	ÜS NOTES	Orthogonal vectors, Orthonormal vectors, Orthonormal basies. Orthogonal Matrices. Orthogonal matrices preserve norm and inner-product. Projections with orthonormal bases. Build an orthonormal basis with Gram-Schmidt (and show correctness of Gram-Schmidt). QR decomposition. Projections and least squares with QR decomposition
W10	Assignment 10 Quiz	ÜS NOTES	Pseudo-inverse, definition and properties. Pseudo-inverse and minimum norm solution. Pseudo-inverse and projection. Polyhedron, projections of sets, Farkas lemma.
W11	Assignment 11 Quız	ÜS NOTES	Determinant and its properties, definition via permutations, connection to matrix inverse, co-factors and the determinant, Cramer's rule. Complex numbers, calculations with complex numbers. Fundamental theorem of algebra, roots of polynomials. Complex-valued vectors and matrices. Eigenvalues and eigenvectors, definition and 2x2 examples.
W12	Assignment 12 Bonus	ÜS NOTES	Characteristic polynomial, algebraic multiplicity, finding eigenvalues and eigenvectors, properties of eigenvalues and eigenvectors. Linear independence of eigenvectors corresponding to distinct eigenvalues. Determinant, trace, and connection to eigenvalues. Eigenvalues and eigenvectors of rotations and other linear transformations. Eigenvalues and eigenvectors of orthogonal matrices. Eigenvalues and eigenvectors of diagonal matrices. Eigenvalues and eigenvectors of projection matrices. Repeated eigenvalues and geometric multiplicity. Linear independence of eigenvectors, complete sets of real eigenvectors. Change of basis, diagonalization, diagonalizable matrices. Similar matrices, eigenvalues of similar matrices.
W13		ÜS NOTES	Spectral theorem: eigenvalues and eigenvectors of symmetric matrices. Rayleigh quotients and their connection to eigenvalues of symmetric matrices. Positive definite matrices, positive semidefinite matrices, Gram matrices. Cholesky decomposition. Singular value decomposition (SVD), derivation of singular value decomposition, connection to eigenvalue decomposition of A^TA and AA^T, compact form of singular value decomposition. Singular values, left singular vectors, right singular vectors.

Last year's mock exam / Last year's exam