Dept Number	C	S 220	Cou	rse Title	Program	nming	with Dat	ta Struct	ures	
Semester Hours		4	Cou	rse	Tessema	Meng	gistu			
			00	SP17						
Catalog	Advanced programming data structures and algorithm design. Tonics included									
Description	advanced language features, data abstraction and object-oriented programming									
	recursion, stacks, queues, linked lists, trees and graphs, sorting and searching. The									
	course meets for three lecture hours and two laboratory hours per week.									
Textbooks										
SP17										
Data Abstraction & Problem Solving w/Java, Frank M. Carrano, 4th Edition, 2015, ISBN: 9780133744057									ISBN:	
Data Abstraction & Problem Solving w/Java, Frank M. Carrano, 4th Edition, 2015, ISBN:										
9780133750379.										
Keferences										
Course Learning Outcomes										
 To learn data abstraction and object-oriented programming. To learn the fundamental data atmatures including stable groups light different to the stable stable										
 To learn sorting and searching techniques and their analysis. 										
• To obtain a good foundation for further study in computer science.										
Assessment of the Contribution to Student Outcomes										
Outcome →	1	2	3	4	5	6	7	8	9	10
Assessed \rightarrow	Х	X	Х							

Prerequisites by Topic

CS 202 and CS 215 each with a grade of *C* or better.

CS 22	0 Programming with Data Structures Page 2								
	Motor Topics Covered in the Covere								
	Major Topics Covered in the Course								
1.	Review of programming; arrays, structures and object oriented programming approach {3								
	classes }								
2.	Programming methodology								
	Design techniques: in-depth treatment of procedural and data abstraction, further emphasis on								
	top-down design, choice of data structures								
	Coding: additional emphasis on programming style, object oriented programming, and								
	documentation, information hiding								
	Correctness: testing and test data, testing end cases, debugging techniques, verification of								
	algorithms, invariants {3 classes}								
3.	Data abstraction and object-oriented programming: levels of abstraction; polymorphism,								
	inheritance, encapsulation {2 classes}								
4.	Reference and dynamic allocation: dynamic allocation; reference parameters {5 classes}								
5.	Implementation of data structures: lists and linear structures; stacks and queues; trees and								
	graphs; hash table {14 classes}								
6.	Recursion								
	Implementation: memory and time considerations; simulating recursion								
	Efficiency considerations: recursive vs. iterative solutions {14 classes}								
	Searching: linear search – review of linear search, searching linked lists, analysis								
	Binary search: review of binary search of arrays, binary search trees, analysis {6 classes}								
7.	Searching and sorting: linear search; binary search; introduction to formal analysis of algorithms								
	N ² sorts: analysis of bubble sort, insertion sort, and selection sort								
	NlogN sorts: quick sort, merge sort, analysis of these sorts {7 classes}								
	Latert Devicing Series 2017								