



## Fourth: Learning Resources

<b>Main Reference:</b>	<i>Introduction to Algorithm</i>		
<b>Author:</b> Cormen, Leiserson, Rivest, Stein	<b>Issue No.:</b> 3 <sup>ed</sup> edition	<b>Publication Year:</b> 2009	
<b>Additional Sources &amp; Websites:</b>	<ul style="list-style-type: none"> <li>• Jeffrey J. McConnell, "Analysis of Algorithms: An Active Learning Approach", Second Edition, Jones &amp; Bartlett, 2008.</li> <li>• Richard Neopolitan and KumarssNaimipour, "Foundations of Algorithms", Fourth Edition, Jones &amp; Bartlett, 2011.</li> </ul>		
<b>Teaching Type:</b>	<input checked="" type="checkbox"/> Classroom <input type="checkbox"/> Laboratory <input type="checkbox"/> Workshop <input type="checkbox"/> MS Teams <input checked="" type="checkbox"/> Moodle		

## Fifth: Learning Outcomes

CILO Code	Course Intended Learning Outcomes (CILOs)	Connection To Program ILOs Code
<b>Knowledge</b>		
**K1	<b>Concepts and Theories:</b> Know and understand basic terms associated with algorithms; such as time and space complexities, Big O notation, Big Omega notation, Big Theta notation, etc. Understand the algorithms analysis criteria.	*PK1
K2	<b>Contemporary Trends, Problems and Research:</b> Apply the algorithms and design techniques to solve modern problems	PK2
K3	<b>Professional Responsibility:</b> Understand principles, concepts, and algorithms of practical problems	PK3
<b>Skills</b>		
***S1	<b>Problem solving skills:</b> Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains;	PS1
S2	<b>Modeling and Design:</b> Design various sorting algorithms using sequential and divide-and-conquer approaches, design various searching algorithms, and design various minimum spanning tree algorithms using greedy approach.	PS2
S3	<b>Application of Methods and Tools:</b> Convert the algorithms to code using a programming language such as JAVA.	PS3
S4	<b>General and Transferable Skills - Communication:</b> Be able to discuss the strengths and limitations of algorithm applications in solving problems.	PS4
S5	<b>General and Transferable Skills</b> Teamwork and Leadership Be able to communicate effectively in a group	PS5

Competences		
****C1	<b>Critical-Thinking Skills - Analytic skills: Assess</b> Analyze and evaluate various sorting algorithms, analyze and evaluate various searching algorithms, analyze and evaluate various minimum spanning tree algorithms. Analyze the complexities of various problems in different domains.	PC1
C2	<b>Strategic Thinking:</b> Greedy and/ or dynamic programming strategy	PC2
C3	<b>Creative thinking and innovation:</b> Solve the problems by using new techniques	PC3
****C1	<b>Critical-Thinking Skills - Analytic skills: Assess</b> Analyze and evaluate various sorting algorithms, analyze and evaluate various searching algorithms, analyze and evaluate various minimum spanning tree algorithms. Analyze the complexities of various problems in different domains.	PC1
C2	<b>Strategic Thinking:</b> Greedy and/ or dynamic programming strategy	PC2

\* P: Program, \*\*K: knowledge, \*\*\*S: skills, \*\*\*\*C: competencies.

## Sixth: Course Structure

Lecture Date	Intended Learning Outcomes ILOs	Topics	Teaching Procedures*	Teaching Methods**	References***
Week1 21/10/2023	K1	Course Syllabus discussion	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Introduction to Algorithms	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Introduction to Algorithms	Face- to-Face	Lecture	Slides on the Moodle
Week2 28/10/2023	K1, K2, K3, S3 S5	Insertion sort	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Pseudocode Conventions	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Analyzing Insertion sort	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Best and Worst case	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Order of growth	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Merge sort	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Analyzing merging sort	Face- to-Face	Lecture	Slides on the Moodle
Week3 4/11/2023	K1, K2, K3, S3 S5	Divide and conquer	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Quick sort	Face- to-Face	Lecture	Slides on the Moodle

	K1, K2, K3, S3 S5	Binary search	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Maximum sub-array problem	Face- to-Face	Lecture	Slides on the Moodle
Week4 11/11/2023	K1, K2, K3, S3 S5	Sorting Algorithms	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Heap sort	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Priority queues	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Counting sort	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Radix sort	Face- to-Face	Lecture	Slides on the Moodle
Week5 18/11/2023	K1, K2, K3, S3, C1, C2, C3, S5	Greedy algorithms	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Activity selection problem	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Knapsack problem	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Minimum spanning tree	Face- to-Face	Lecture	Slides on the Moodle
Week6 25/11/2023	K1, K2, K3, S3, C1, C2, C3, S5	Dynamic Programming	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Fibonacci series	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Fibonacci series	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Rod cutting problem	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Rod cutting problem	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Longest common subsequence	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Longest common subsequence	Face- to-Face	Lecture	Slides on the Moodle
Week7 2/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Graph algorithms	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Graph algorithms	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Graph algorithms	Face- to-Face	Lecture	Slides on the Moodle
<b>Midterm Exam 3/12/2023 – 14/12/2023</b>					
Week8 9/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Applications of Algorithms in ML	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Tutorial WEKA+KEEL	Face- to-Face	Lecture	Slides on the Moodle
Week9 16/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Applications of ML algorithms in Medical Domain	Face- to-Face	Lecture	Slides on the Moodle
Week10 23/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Applications of ML algorithms in Cyber Security	Face- to-Face	Lecture	Slides on the Moodle

Week11 30/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Data Science Algorithms	Face- to-Face	Lecture	Slides on the Moodle
Week12 6/1/2024	K1, K2, K3, S3, C1, C2, C3, S5	Students Presentations	Face- to-Face	Lecture	Slides on the Moodle
Week13 13/1/2024	K1, K2, K3, S3, C1, C2, C3, S5	Students Presentations	Face- to-Face	Lecture	Slides on the Moodle
<b>Final Exam 21/1/2024-1/2/2024</b>					

\* Teaching procedures: (Face-to-Face, synchronous, asynchronous). \*\* Teaching methods: (Lecture, video.....).

\*\*\* Reference: (Pages of the book, recorded lecture, video....).

## Seventh: Assessment Methods

Methods	Online Learning	Blended Learning	Face-To-Face Learning	Measurable Course (ILOs)
First Exam				
Second Exam				
Mid-term Exam			35	
Participation			15	
Asynchronous Activities				
Final Exam			50	

## Eighth: Course Policies

- All course policies are applied to all teaching patterns (online, blended, and face-to-face Learning) as follows:
  - a. Punctuality.
  - b. Participation and interaction.
  - c. Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).

Approval	Name	Date	Signature
Head of Department			
Faculty Dean	Prof. M. Hassan		