



**MAKLUMAT KURSUS UNTUK SEMESTER/PENGGAL SEMASA**  
**COURSE INFORMATION FOR CURRENT SEMESTER/TERM**

Sesi Akademik <i>Academic Session</i>	2024/2025
Semester/Penggal <i>Semester/Term</i>	2
Kod Kursus <i>Course Code</i>	WIA2005
Tajuk Kursus <i>Course Title</i>	Rekabentuk dan Analisa Algoritma <i>Algorithm Design and Analysis</i>
Bahasa Pengantar <i>Medium of Instruction</i>	Inggeris <i>English</i>
Rujukan Utama <i>Main Reference</i>	<ol style="list-style-type: none"> <li>1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. 2022 (April). Introduction to Algorithms, 4th edition. MIT Press.</li> <li>2. Erickson, J., 2019. Algorithms.</li> <li>3. George T. H., 2021. Learning Algorithm. A programmer's Guide to Writing Better Code. O'reilly</li> </ol>
Strategi Pembelajaran <i>Learning Strategies</i>	Kuliah, Tutorial, Seminar  <i>Lecture, Tutorial/Lab, Group Presentation Seminar.</i>
Masa Pembelajaran Pelajar <i>Student Learning Time</i>	<p>Bersemuka / <i>Face to face</i>: 48 jam / <i>hours</i></p> <p>Tidak Bersemuka / <i>Non Face to face</i>: 8 jam / <i>hours</i></p> <p>Masa Persediaan Pelajar / <i>Student Preparation Time</i>: 105 jam / <i>hours</i></p>
Kemahiran Boleh Pindah <i>Transferable Skills</i>	Kemahiran rekabentuk algoritma yang efisien.  <i>Efficient algorithm designing skill.</i>
Pensyarah / <i>Lecturer</i>  Bilik / <i>Room</i>	<p>Dr. Asmiza Abdul Sani (AAS) asmiza@um.edu.my</p> <p>Dr Nasuha Mohd Daud (NMD)</p>



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<p>Telefon/e-mel  <i>Telephone/e-mail</i></p>	<p>nasuha@um.edu.my</p> <p>Dr. Adeleh Asemi Zavareh  adeleh@um.edu.my</p> <p>Dr. Uzair Iqbal  uzairiqbal@um.edu.my</p>
<p>Sesi Kuliah / <i>Lecture Session:</i>  Hari/Masa / <i>Day/Time</i>  Tempat / <i>Venue</i></p>	<p>Rujuk jadual / <i>Refer to timetable</i></p>
<p>Sesi Tutorial/Amali:  <i>Tutorial/Practical Session:</i>    Hari/Masa / <i>Day/Time</i>    Tempat / <i>Venue</i></p>	<p>Rujuk jadual / <i>Refer to timetable</i></p>
<p>Perincian Pemberatan Penilaian  <i>Detail of Assessment Weightage</i></p>	<p><b>Penilaian Berterusan / Continuous assessment (70%):</b></p> <ul style="list-style-type: none"> <li>• Tutorial Viva / <i>Viva Tutorial</i> (15%) Minggu/Week 2-14</li> <li>• Ujian atas Talian / <i>Online Test</i> (20%): Minggu/Week 4</li> <li>• Laporan Projek Berkumpulan / <i>Group Project Report</i> (35%):  Minggu/Week 11 - 12.</li> </ul> <p><b>Peperiksaan Akhir / Final Examination (30%):</b></p> <ul style="list-style-type: none"> <li>• Peperiksaan Akhir / <i>Final Exam</i>: Refer to exam timetable</li> </ul>

**Jadual Pengajaran / Teaching Schedule**

Minggu Week	Topik & Aktiviti Topic & Activities	Rujukan References
<b>1 (21/3)</b>	Preliminary Maths and Python Practice Activities: Self-paced tutorial (4 Hours)	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. 2022 (April). Introduction to Algorithms, 3rd edition. MIT Press.  Erickson, J., 2019. Algorithms.  George T. H., 2021. Learning Algorithm. A programmer's Guide to Writing Better Code. O'reilly.  Jon Kleinberg & Éva Tardos. 2013. Algorithm Design. 1st Edition. Pearson.  Robert Sedgewick & Kevin Wayne. 2011. Algorithms. 4th Edition. Addison-Wesley
<b>2 (28/3)</b>	Lecture 1: Introduction to Algorithm Design & Analysis - Part 1 <ul style="list-style-type: none"> <li>• Introduction to Algorithm</li> <li>• Asymptotic Analysis</li> <li>• Analysis of Iterative Algorithm</li> </ul> Tutorial 1: Lecture 1 topics  Activities: Online Lecture (2 hours), Online Tutorial (2 hours)	
<b>3 (4/4)</b> <b>Hari Raya Puasa</b>	Lecture 2: Introduction to Algorithm Design & Analysis - Part 2 <ul style="list-style-type: none"> <li>• Analysis of Recursive Algorithm</li> </ul> Tutorial 2: Lecture 2 topics  Activities: Asynchronous Lecture (2 hours), Asynchronous Tutorial (2 hours).	
<b>4 (11/4)</b>	Lecture 3: Sorting Algorithm <ul style="list-style-type: none"> <li>• Bubble sort</li> <li>• Counting sort</li> <li>• Radix sort</li> <li>• Bucket sort</li> <li>• Shell sort</li> </ul> Tutorial 3: Lecture 3 topics  Activities: Physical Lecture (2 hours), Physical Tutorial (2 hours).	
<b>5 (18/4)</b>	Lecture 4: String Matching <ul style="list-style-type: none"> <li>• Naïve algorithm</li> <li>• Rabin-Karp</li> <li>• Finite-automaton</li> <li>• Knuth-Morris-Pratt</li> </ul>	

	<p>Tutorial 4: Lecture 4 topics</p> <p><b>Ujian atas Talian / Online Test (20%)</b></p> <p>Topic:</p> <ul style="list-style-type: none"> <li>Lecture 1, 2 – Introduction to Algorithm</li> </ul> <p>Duration: 1 hour</p> <p>Type: MCQ</p> <p>During lecture session</p> <p>Activities: Asynchronous Lecture (2 hours), Asynchronous Tutorial (2 hours)</p>	
<b>6 (25/4)</b>	<p>Lecture 5: Divide and Conquer</p> <ul style="list-style-type: none"> <li>Introduction to Divide and Conquer design paradigm</li> <li>Merge sort</li> <li>Quick sort</li> </ul> <p>Tutorial 5: Lecture 5 topics</p> <p>Lecture 6: Heaps and Heapsort</p> <ul style="list-style-type: none"> <li>Heaps and Heap Sort</li> </ul> <p>Tutorial 6: Lecture 6 topics</p> <p><b>Publish Laporan Projek Berkumpulan / Group Project Report (35%)</b></p> <p>Activities: Physical Lecture (2 hours), Physical Tutorial (2 hours)</p>	
<b>7 (2/5)</b>  <b>Labour Day (1/5) – Public Holiday</b>	<p>Lecture 7: Probabilistic Analysis and Randomized Algorithm</p> <ul style="list-style-type: none"> <li>Hiring Problem</li> <li>Randomise Select and Select Algorithm</li> </ul> <p>Tutorial 7: Lecture 7 topics</p> <p>Activities: Physical Lecture (2 hours), Asynchronous Tutorial (2 hours)</p>	
<b>MIDSEM BREAK</b>		

<b>8 (16/5)</b>	<p>Lecture 8: Hashing</p> <ul style="list-style-type: none"> <li>• Hash table</li> <li>• Direct access table</li> <li>• Collision and chaining</li> <li>• Open addressing</li> </ul> <p>Tutorial 8: Lecture 8 topics</p> <p>Activities: Physical Lecture (2 hours), Physical Tutorial (2 hours)</p>	
<b>9 (23/5)</b>	<p>Lecture 9: Greedy Algorithms</p> <ul style="list-style-type: none"> <li>• Greedy Knapsack</li> <li>• Huffman</li> <li>• Job sequencing</li> </ul> <p>Tutorial 9: Lecture 9 topics</p> <p>Activities: Physical Lecture (2 hours), Asynchronous Tutorial (2 hours)</p>	
<b>10 (30/5)</b>  <b>(Kaamatan Harvest Festival - 30/5)</b>	<p>Lecture 10: Dynamic Programming</p> <ul style="list-style-type: none"> <li>• Fibonacci numbers</li> <li>• Rod Cutting</li> <li>• Dynamic Knapsack</li> </ul> <p>Tutorial 10: Lecture 10 topics</p> <p>Activities: Physical Lecture (2 hours), Physical Tutorial (2 hours)</p>	
<b>11 (6/6)</b>  <b>(Day of Arafah – the day before Hari Raya Aidiladha)</b>  <b>Public Holiday – Monday (Agong's Bday – 2/6)</b>	<p>Lecture 11: Graph Algorithms</p> <ul style="list-style-type: none"> <li>• Elementary graph algorithm: BFS, DFS, Topological Sort</li> <li>• Minimum Spanning Tree: Prim and Kruskal</li> <li>• Single Source Shortest Path: Dijkstra and Bellman-Ford</li> <li>• All Pair Shortest Path: Floyd-Warshall</li> </ul> <p>Tutorial 11: Lecture 11 topics</p> <p>Activities: Physical Tutorial (2 hours), Asynchronous Lecture (3 hours)</p>	

<b>12 (13/6)</b>	<p>Live Online Group Project Presentation</p> <p>Activities: Seminar (2 hours)</p>	
<b>13 (20/6)</b>	<p>Live Online Group Project Presentation</p> <p><b>Group Project Report Submission (35%)</b></p> <p>Activities: Seminar (4 hours)</p>	
<b>14 (27/6)</b>  <b>(Public Holiday Awal Muharam 27/6)</b>	<p>Lecture 12: Swarm Intelligence</p> <ul style="list-style-type: none"> <li>• Ant Colony Optimization (ACO)</li> <li>• Particle Swarm Optimization (PSO)</li> <li>• Artificial Bee Colony Algorithm (ABC)</li> </ul> <p>Tutorial 12: Lecture 11 topics</p> <p>Activities: Asynchronous Lecture (2 hours), Asynchronous Tutorial (2 hours)</p>	