**Syllabus / Course Outline**

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| --- | --- | --- |
| **Course Name: Advanced Algorithm Analysis** | | |
| **Course Code: COMP 502** | **Course Type: MS (Required)** | **Course Credits: 3** |
| **Class Timings:**  **Monday**  **5:30 PM – 8:15 PM** | **Section: A** | **Office Hours:**  **Office: S-426 D**  M,F 3 PM - 4 PM  TR 9:30 AM - 11:30 PM |
| **Instructor Name: Sharoon Nasim** | | |
| **Instructor Contact Details**  Email: **sharoonnasim@fccollege.edu.pk**  Office Hours (face to face and/ or online):  Guidelines for contacting instructor: Please email. | | |
| **Course Description**:  This course is an introductory graduate-level and advanced undergraduate course on design and analysis of algorithms. Techniques such as divide-and-conquer, dynamic programming, randomized algorithms, and graph algorithms will be taught. | | |
| **Course Objectives or** [**Student Learning Outcomes**](https://docs.google.com/document/d/1me9vpl8iKR_zNX9gIODm7gkVFY9VkuSKpUJe1VyI57M/edit) **(SLOs)**   * Students will know about algorithmic approaches * They will be able to analyze different algorithms * They will be able to design algorithms for similar problems. | | |

**Text books:**

Introduction to Algorithms by T. Cormen, C. Lieserson et al.

Algorithms 2006 (DPV) S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani

Algorithm Design by J. Kleinberg and E. Tardos

**Lectures and Examinations:**

One weekly lecture of 150 minutes duration

Two in-class midterm examinations

Comprehensive final examination

Home works

**Course Assessment (Tentative):**

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| --- | --- |
| Attendance | 5% |
| Class Activities/ Participation | 5% |
| Assignments/ Homework | 10 % |
| Quizzes | 15 % |
| Midterm – 1 | 15 % |
| Midterm - 2 | 20% |
| Final Exam | 30 % |
| **Total** | **100.00%** |

**Tentative Course Schedule & Topics**

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| --- | --- |
| **Classes** | **Topics** |
| 1 | Introduction, Asymptotic Notations, Posterior and Priori Analysis,  P & NP Classes, Interval Scheduling by Greedy Approach,  Weighted Interval Scheduling by Dynamic Programming |
| 2 | Halting Problem, Longest Common Subsequence,  NP-Hard Satisfiability Problem,  Divide & Conquer Fibonacci Series & Merge Sort Analysis (Time Complexity) |
| 3 | Convex Hull, Master Theorem,  Solving Recurrence Relations, Median Finding (Medians of Median) |
| 4 | Fast Fourier Transform (FFT) |
| **Midterm -1** | |
| 5 | Randomized Algorithm: Quicksort, Matrix Multiply |
| 6 | Searching: B-Tree, Van Emde Boas, |
| 7 | Hashing: Universal & Perfect Hashing |
| 8 | Dynamic Programming: Knapsack & Matrix Chain Multiplication |
| **Midterm – 2** | |
| 9 | Minimum Spanning Trees, Huffman Encoding (Space Complexity) |
| 10 | Hamiltonian Graph (Travelling Salesman Problem) NP-Problem |
| 11 | BFS Ford Fulkerson Algorithm |
| 12 | Linear Programming: Simplex, Pattern Recognition basics of Machine Learning (Bonus) |
| **Final Exam** | |

# **Missed Assignments/ Make-Ups/ Extra Credit**

* Late assignments will be accepted with 50% deduction
* No retake of quiz or exam unless approved.

# **Grade Determination & Course Assessment as per FCC Policy:**

Relative grading will be done so giving your solved assignments and homeworks to your friends can have negative impact on your grade

# **Changes to the Syllabus:**

This syllabus was designed to convey course information and requirements as accurately as possible. It is important to note however that it **may** be subject to change during the course depending on the needs of the class and other situational factors. Such changes would be for your benefit and you will be notified of them as soon as possible.

# **Student Support Services**

[Student Counseling Services](https://www.fccollege.edu.pk/ccc/campus-counseling-center/).Students can contact the [Campus Counseling Center](https://www.fccollege.edu.pk/ccc/campus-counseling-center/) at 0331-444-1518 or email [ccc@fccollege.edu.pk.](mailto:ccc@fccollege.edu.pk)

[Writing Center](https://www.fccollege.edu.pk/faculty-of-humanities/writing-center/) [Mercy Health Center](https://www.fccollege.edu.pk/mercy-health-center/)

# **Other Useful FCCU Policy Documents:**

[Sexual Harassment Policy](https://www.fccollege.edu.pk/wp-content/uploads/2018/05/Doc1.pdf) [Anti-Corruption Policy](https://www.fccollege.edu.pk/wp-content/uploads/2018/05/Anti-corruption.pdf) [Academic integrity](https://www.fccollege.edu.pk/policy-on-academic-integrity/) [Plagiarism Policy](https://www.fccollege.edu.pk/wp-content/uploads/2018/05/FCCU-Plagiarism-Policy.pdf) [Academic Calendar](https://www.fccollege.edu.pk/academic-calendar/)