



University of Tehran
School of Electrical and Computer Engineering

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| Course | Advanced Computer Mathematics | | |
| Course type, level, credit | Elective | Graduate | 3 units |
| Field, Major | Computer Engineering | Software | |
| Co-requisite(s) | - | | |
| Prerequisite(s) | - | | |
| Prerequisite by topic | Discrete Mathematics | | |
| Goals | In this course, students get familiar and deeply understand fields related to the computer and operation research. Subjects such as recurrence, summation, number theory, Optimization, graphs, Generating functions, etc., are the building blocks of algorithms, networking, security, hardware/software testing. | | |
| Outcome | Upon successful completion of the course, students will deeply understand Discrete mathematics and its applications which is the foundation of Computer science and used in many fields including security, algorithms, tests, networking, etc. Furthermore, it gives an essential tool to do research in realms related to computer | | |
| Topics | | | |
| Required software | 1- Introduction, induction, etc. (1 sessions) 2- Recurrence (1 session) 3- Integer functions (2 sessions) 4- Summation, Difference Calculus, (6 sessions) 5- Number Theory (5 sessions) 6- Counting, binomial coefficient and Combinatorics (6 sessions) 7- Special Numbers (2 sessions) 8- Generating functions (4 sessions) 9- Graph Theory (4-5 sessions) 10- Optimization(linear and convex) (around 4-5 sessions) 11- Game Theory (If it was enough time) | | |
| Assignments | 10 homework | | |
| Projects | - | | |
| Grading | Assignments and quiz: 35 % Project: 5% Midterm exam: 30 % Final exam: 30 % | | |

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| Textbook(s) | [1] Graham, Knuth and Patashnik, "Concrete Mathematics: A foundation for Computer Science" Addison-Wesley, 1994. [2] Allen Tucker, "Applied Combinatorics", Wiley 2003. [3] Bondy and Murty, "Graph Theory with Applications" |
| Further readings | [1] Many papers and articles which will be available in the website of the course. |