

**CENG 223 - Discrete Computational Structures / Sections I, II and III**

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**Teaching Assistants:** Onur Yigit Arpali, M. Ferhat Arslan, Fatih Semiz, Gunes Sucu

1. **Catalog Data:** Discrete Computational Structures (3-0) 3  
See the Catalog for more descriptive information. Prerequisites: None
2. **Textbook(s):**  
K.H.Rosen, *Discrete Mathematics and Its Applications*, McGraw-Hill, Seventh Edition, 2013.
3. **Goals:** To teach the basics of discrete mathematical structures.
4. **Course Outline:**  
*Topics*
  - (a) Propositional Logic { 1 week }  
Logic, Equivalences
  - (b) Predicate Logic { 2 weeks }  
Predicates and Quantifiers, Nested Quantifiers, Methods of Proof, Natural Deduction (additional material)
  - (c) Sets and Functions { 1.5 weeks }  
Overview of Sets and Functions, Countability,, Growth of Functions, Complexity of Algorithms
  - (d) Integers { 1.5 weeks }  
Integers and Division, Integers and Algorithms, Applications of Number Theory (Reading Assignment)
  - (e) Induction and Recursion { 1 week }  
Mathematical Induction, Recursive Definitions and Structural Induction, Recursive Algorithms
  - (f) Counting { 2.5 week }  
Overview of Permutations and Combinations, Recurrence Relations, Solving Recurrence Relations, Generating Functions, Inclusion and Exclusion
  - (g) Relations { 1 week }  
Relations and Their Properties, Representing Relations, Closure of Relations, Equivalence Relations, Partial Orderings

(h) Graphs{*2 weeks*}

Introduction to Graphs, Graph Terminology, Representing Graphs, Connectivity, Euler and Hamiltonian Paths, Shortest Path Problem, Graph Coloring

(i) Trees {*1.5 weeks*}

Int to Trees, Applications of Trees, Spanning Trees, Min Spanning Trees

*Evaluation*

(a) Take-home Exams (5) 20%,

- Prepare your solution using Latex and compile it on *inek* platform before submission.
- Upload the Latex source document on due dates.
- Ensure that the latex document is compilable on *inek*, otherwise it will not be evaluated.
- Non-latex documents will not be considered for evaluation.

(b) Midterm Exam 35% (*Dec 4, 2020, Tentative* ).

(c) Final Exam 45% (*To be announced*).

5. Communication: All announcements including take-home exam assignments, recitations, etc will be made on **ODTUClass** (<https://odtuclass.metu.edu.tr>).

**6. Course Conduct**

- All students in Sections 1, 2 and 3 must follow "Ceng 223 All Sections" on ODTU-CLASS.
- Lecture hours will be the same as those of Section 1 announced in the schedule.
- Lecture hours for Section 2 and 3 are reserved for additional activities such as Latex review, course review, problem solving, etc.

**7. Policy:**

- The take-home exam assignments that are designated as individual assignments must be completed individually. Copying from others, either from other students or off the internet is strictly forbidden and will surely constitute grounds for failure.
- In case of cheating in one of the take-home exams, all of the take-home exams will be graded as 0 and furthermore the case will be passed to the Student Discipline Committee.