CS 330 — Discrete Structures
Syllabus version 1.0 (not complete)

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Fall 2019

1 Course Summary

Welcome to CS 330 Discrete Structures. This class has two major thrusts which complement each other nicely: increasing the mathematical sophistication (proofs and logic) and introducing the mathematical foundation of computer science. The emphasis is on understanding the material rather than simply accumulating information.

The class consists of two weekly (standard) lectures and one recitation session (officially called “lab”, Fridays 10:00-10:50, normally administered by the TA) in which students solve problems related to the lectures.

2 Textbook


Another optional textbook is textbook is Introduction to Algorithms (third edition) by Cormen, Leiserson, Rivest, and Stein, MIT Press, 2009. ISBN-10: 0262033844 — ISBN-13: 978-0262033848 It should be available at the bookstore, and the library has a copy on reserve (available only inside the building). Other editions of the book will be fine for learning, but there may be differences in the assigned exercises and problems. Our library has on-line access to the third edition of this book:
from http://http://www.gl.iit.edu/database/database.htm look for Books 24x7, login and search for “Cormen”. From this book, the Appendix - Mathematical Background is part of what we cover in this class.
3 Current Catalog Description

Introduction to the use of formal mathematical structures to represent problems and computational processes. Topics covered include Boolean algebra, first-order logic, recursive structures, graphs, and abstract language models. Co-requisite: CS 116 or CS 201. (3-0-3)

4 Course Goals

Students should be able to:

1. Illustrate by examples the basic terminology of functions, relations, and sets and demonstrate knowledge of their associated operations.

2. Demonstrate in practical applications the use of basic counting principles of permutations, combinations, inclusion/exclusion principle and the pigeonhole methodology.

3. Calculate probabilities of events and expectations of random variables for problems arising from games of chance.

4. Establish and solve recurrence relations that arise in counting problems including the problem of determining the time complexity of recursively defined algorithms.

5. Model logic statements arising in algorithm correctness and real-life situations and manipulate them using the formal methods of propositional and predicate logic.

6. Outline basic proofs for theorems using the techniques of - direct proofs, proof by counterexample, proof by contraposition, proof by contradiction, mathematical induction.

7. Relate the ideas of mathematical induction to recursion and recursively defined structures.

8. Illustrate by example basic terminology of graph theory and model problems in computer science using graphs and trees.

9. Deduce properties that establish particular graphs as Trees, Planar, Eulerian, and Hamiltonian.

10. Illustrate the application of trees and graphs to data structures.

11. Explain the basic concepts modeling computation including formal machines, languages, finite automata, Turing machines.
5 Getting Help

Office hours are Monday 11:30-12:30 and Wednesday 2:00-3:00 in room SB 228D, or by appointment. For an appointment send e-mail to calinescu@iit.edu or call 312-567-5273. Please spend a little time trying to understand yourself a homework problem before asking for help.

Most handouts (including this syllabus, homeworks, and some solutions) will be available at http://www.cs.iit.edu/~cs330 or on blackboard.

The currently assigned TA for the class is TBD (tbd@hawk.iit.edu), available after the Friday’s recitations until 12, and TBD 10AM-11AM in room SB TBD (312-567-tbd). Students are expected to check email every week day of the semester. Clarifications on assignments or other important announcements might be sent by email - and will also be posted on the web page.

6 Grading

The grading allocation is given below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homeworks</td>
<td>55%</td>
</tr>
<tr>
<td>Midterm</td>
<td>11%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>21%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>9%</td>
</tr>
<tr>
<td>Class Participation</td>
<td>4%</td>
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</tbody>
</table>

The midterm will be on Friday Oct. 18 (during the recitation session). The final exam will be held as scheduled by the registrar, in the week of Dec 2-7. Eleven homeworks will count for the grade out of 12 assigned, due every Wednesday other than exam weeks. You can discuss the problems with each other, but must write the solutions individually. Seek help from me or the TA if you are having difficulties with the homework. Except for extraordinary circumstances, homeworks will be accepted at latest one week late. The penalty for late submission is 5%, for two days late, 10% for five days late, and 20% for one week late.

The exams are closed books and closed notes, except for the notes distributed by me, which I will re-distribute right before the exam. The exams will be strictly individual, and will contain (possibly slightly modified) homework problems. There will be no make-up exams, other than the final exam. Exams missed for valid reasons will be replaced by a higher weight of the final.

There will be 11 quizzes (15-40 minutes each), each Monday other than in the first week and in the weeks with exams. Quiet discussion within small groups during the quizzes is allowed. A “small group” consists of up to four students, sitting in the same row with one of them at the end of the row. Each group should submit only one solution. Please contact (email) me if you are looking for “quiz-mates”. The lowest two quiz scores will be dropped when computing the composite score. Late in November there will a 12th quiz for those who missed a quiz with a valid reason.

Attendance (including the recitation) is mandatory and will be reflected in the “class participation” score (valid excuses are required after the third missed class/recitation). Also,
disturbing the class will decrease this score. Every electronic device (anything with an on/off button) should be off and stored away during the class (exception: disability-helping devices).

Standard departmental policy regarding academic (dis)honesty applies. This includes http://www.iit.edu/student_affairs/handbook/information_and_regulations/code_of_academic_honesty. In particular, homework solutions copied from the Internet are not allowed. If I have evidence that the work submitted is not your own, I will assign a score of zero on that particular assignment at the first occurrence. It may also be reported to academichonesty@iit.edu. The second occurrence will be reported and an appropriate sanction will be applied after consultation with the office of the Associate Provost for Academic Affairs. Whenever in doubt, ask first if some action is allowed or not. Moreover, the students must submit the signed College of Science Academic Integrity Pledge together with the first homework.

Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources and make an appointment to speak with me [the instructor] as soon as possible. The Center for Disability Resources (CDR) is located in Life Sciences Room 218, telephone 312-567-5744 or disabilities@iit.edu.

A composite score will be computed, and grades assigned almost based on the ranges: A=85-100 B=75-84 C=65-74 D=55-64 E=0-54. There is no prescribed curve and you are not competing with each other.