CSC 1500        Fundamental Structures        Fall 2017

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Office Hours: Mondays   Wednesdays 8:30 -9:30 AM, 5057 Woodward Ave, , Rm 14109.4, ; other hours by appointment

Teaching Assistant 1: Sumukhi Chandrashekar (Lab Instructor for CSC 1501, Section001, 318 State., M/W 5:30-6:45 PM))
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Office Hours: Mondays/Wednesdays, 11:45-12:45 AM, 5057 Woodward Ave, Suite 3211 ; 5057 Woodward Ave, Suite

Teaching Assistant 2: Xiangrui Li (Lab Instructor for CSC 1501 Section 002, 314 State, M/W 4:00-5:15 PM )
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Office Hours: Mondays/Wednesdays, 10:00-11:00 AM, 5057 Woodward Ave, Suite 2211

Teaching Assistant 3: Nafiseh SaberianSikai (Lab Instructor for CSC 1501 Section 005, 0073 SCLB, M/W )
E-mail: nafiseh.saberian@wayne.edu
Office Hours: Tuesdays 12:00-1:00 PM. Wednesdays 5:15-6:15 PM, 5057 Woodward Ave, Suite 3211

Lectures: Mondays and Wednesdays 2:30 -3:45 P.M. State 306). The lectures are scheduled to be recorded using ECHO. Usually, it is available on Blackboard after about an hour after the lecture. To access it, you have to use WSU ID and password

Textbook (Recommended but NOT REQUIRED): Discrete Mathematics and Its Applications (ANY EDITION) by Kenneth H. Rosen.

Prerequisites: CSC 1100 and CSC 1101, MAT 1800, co-requisite CSC 1501
Note: Students who have not finished the prerequisites should not take this course. The Instructor reserves the right not to give any grade to those who ignore this advice.

Course Overview:
This course is designed to give students studying computer science many of the mathematical foundations they need for their future studies. The following themes are interwoven in the text chosen: (1) Mathematical reasoning - to read, comprehend, and construct mathematical arguments. Topics include logic and mathematical induction and gate arrays. (2) Combinatorial analysis and probabilities - to count or enumerate objects and determine probabilities of various events. Topics include recurrence relations and their solutions, Bayes' theorems, reliability analysis. (3) Discrete Structures - to understand the abstract mathematical structures used to represent discrete objects and relationship between these objects. Topics include sets, relations, graph, trees and decision-making. (4) Applications and modeling - to solve practical problems. Matrices (5) Algorithmic thinking – to learn the specification of the algorithm, the verification that it works properly, and the evaluation of its complexity (Computer memory and time requirements) - sorting.

Course Learning Outcomes
Through this course, students will gain an initial ability to understand, analyze and solve problems in discrete mathematics relevant to computer science. In the accompanying lab course, CSC 1501, they will be able to implement the solutions on a computer using both C++ language.
Specifically, upon completion of the course, students should be able to:
1. Understand how a computer interacts with the human being – how numbers, text, pictures, sounds are transferred to binary codes and how computer processes that information using digital circuits.
2. Learn various techniques for proving theorems (direct proof, indirect proof, proof by induction etc) and how to use recursive relationships to calculate various functions.
3. How to determine if there is an error in transmission of information (maximum one bit error is allowed) and how to correct the error (Hamming Code)
4. How permutations and combinations , concepts of probability and Bayes’ theorems are used in computer science, , in particular to the decision making (using a decision trees) to maximize
utility, to improve on the reliability of computer systems, to determine causes of various events 
(supplier for defective part, causes for erroneous transmission etc)

5. Know the characteristics of a good algorithm and how to write good algorithm. The examples will 
be multiplication of binary numbers, sorting of numbers, finding the smallest/largest number in a 
set of numbers, finding greatest (least) common divisors etc.

6. How functions and relations are used in data base management (SQL)

7. How to use graph theory to calculate shortest path in a network, find the Eulerian path, use graph 
coloring for many applications (e.g., to scheduling exams, TV frequencies assignment, index 
registers), to use spanning trees to build computer communication networks. To know that there 
are some computationally complex problems as illustrated by traveling salesman problem and 
Hamiltonian path problem

8. How to use matrices in animation, optimal assignment of jobs, error detection and correction in 
communication (Hamming code), economic modeling, consumer loyalty, network flow, use 0-1 
matrices in connectivity problems (e.g., on Facebook), making fractals

9. How RSA algorithm is used for encryption, how a simple algorithm can lead to complex phenomenon like chaos

These learning objectives will be assessed through homework and exams

Attendance: Attending all lectures is essential; the assignments, exams, quizzes, etc. will be based primarily 
(although not exclusively) on the material presented in these lectures. Also, assignments due dates, explanation 
and clarification of assignments, and material outside textbook will be presented during lectures. If you miss 
a lecture, it is your responsibility to obtain the information covered in the session from your fellow classmates.

Homework and Examinations: There will be 10-12 homework assignments, due at the beginning of the 
lecture period of the due date. No late assignment will be accepted. Since each assignment is an integral 
part of the course, the instructor reserves the right to give a failing grade to anyone who is turning in 50% 
or less of the homework. The homework is a very important tool for learning the material taught in the 
lecture. Therefore, it is very important that you do the homework on your own.

There will be held three examinations on or about October 11, November 8, and December 11, 2017 (dates 
are subject to change, but at least one week notice will be given). All the examinations will be held during 
the regular lecture hours. The examinations will be closed books, closed notes and closed neighbors. In 
order to pass the course, you must pass all exams. There will be no make-up examinations.

Final grade: For the final grade, home works and exams are weighted as follows:

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<tr>
<th>Component</th>
<th>Weightage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>25%</td>
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<tr>
<td>Exam 1</td>
<td>25%</td>
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<tr>
<td>Exam 2</td>
<td>25%</td>
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<td>Exam 3</td>
<td>25%</td>
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</tbody>
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The final letter grades will be determined approximately as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>92-100%</td>
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<tr>
<td>A-</td>
<td>90-91%</td>
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<tr>
<td>B+</td>
<td>88-89%</td>
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<tr>
<td>B</td>
<td>82-87%</td>
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<tr>
<td>B-</td>
<td>80-82%</td>
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<tr>
<td>C+</td>
<td>78-79%</td>
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<tr>
<td>C</td>
<td>72-77%</td>
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<tr>
<td>C-</td>
<td>70-71%</td>
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<tr>
<td>D+</td>
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<tr>
<td>D</td>
<td>62-67%</td>
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<td>D-</td>
<td>60-61%</td>
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<td>F</td>
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A grade of Incomplete (I) will be not be given.

Please familiarize yourself with the university policy about withdrawal from the course (see the last 
paragraph here)

Students Responsibilities and Academic Honesty: As a college student, who is committed to seek a 
higher education, we expect you be a very responsible person. At the least, please:

* Do your best to understand the material covered in the class;
  ask questions when you do not understand.
* Be aware of the homework assignments and deadlines.
* Obtain notes and handouts from your classmates if you miss a class for unavoidable circumstances.
*Turn in your assignments in neat, readable and easily accessible form.* Obtain notes and handouts from your classmates if you miss a class for unavoidable circumstances.

Also we expect all of you to have the highest level of academic honesty. We expect each of you to do your work (assignments, and exams) yourself and strongly encourage you to discuss with the instructor(s) regarding any problems which you might have in the course work. However, in fairness to all, if we find two or more assignments, which appear to be copied from each other, we will split the points evenly among all those involved (no matter who copied from whom). Repeated incidents will be dealt with severe disciplinary actions. More specifically, according to new policy (per memo from the provost dated April 17, 2017).

**Academic misbehavior...includes...unauthorized reuse of work product..., which means submission for academic credit, without the prior permission of the instructor, of substantial work product previously submitted for credit in another course.**

**Course Drops and Withdrawals:** In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Pipeline. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week. Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at: [http://reg.wayne.edu/pdf-policies/students.pdf](http://reg.wayne.edu/pdf-policies/students.pdf)

**Religious Holidays:**
Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

**Students with disabilities:** If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours or at another agreed upon time to discuss your needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

**Student services:**
- The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit [www.success.wayne.edu](http://www.success.wayne.edu) for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).
- The Writing Center is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit [http://clasweb.clas.wayne.edu/](http://clasweb.clas.wayne.edu/) writing to obtain information on tutors, appointments, and the type of help they can provide.

**Class recordings:**
Students need prior written permission from the instructor before recording any portion of this class. If permission is granted, the audio and/or video recording is to be used only for the student’s personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. Students registered with Student Disabilities Services (SDS) who wish to
record class materials must present their specific accommodation to the instructor, who will subsequently comply with the request unless there is some specific reason why s/he cannot, such as discussion of confidential or protected information.