CSC 226 Course Syllabus

CSC 226 – Discrete Mathematics for Computer Scientists

Section 001 & 002
FALL 2015
3 Credit Hours

Course Description

CSC 226 **Discrete Mathematics for Computer Scientists** ***UNITS:*** *3 - Offered in Fall and Spring*

Prerequisite: MA 101 or equivalent completed in high school ; CSC,CSU Majors and minors;CPE,CPU Majors
Propositional logic and the predicate calculus. Logic gates and circuits. Methods of proof. Elementary set theory. Mathematical induction. Recursive definitions and algorithms. Solving recurrences. The analysis of algorithms and asymptotic growth of functions. Elementary combinatorics. Introduction to graph theory. Ordered sets, including posets and equivalence relations. Introduction to formal languages and automata.

Learning Outcomes

At the conclusion of this course, students should be able to

1. Represent logical statements in propositional and predicate calculus, and use truth tables and formal proofs to determine their truth values.

2. Create a truth table for a logical expression. Derive a logical expression from a given truth table. Design a circuit to perform a simple task.

3. Construct a circuit from a logical expression using AND, OR, and NOT gates. Simplify logical expressions. Derive a logical expression from a given circuit.

4. Describe set notations using predicate calculus. Determine the power of a set. Use predicate calculus to prove set theoretic propositions.

5. Describe and use the first, second, and general principles of proof by induction. Derive closed form representations for recursively defined sequences; prove their correctness by induction. Derive recursive sequences from closed form functions and prove their equivalence by induction.

6. Describe asymptotic growth of functions, compare functions using big-oh notation. Compare asymptotic growth and prove inequalities by induction. Determine and solve recurrences arising from algorithms. Determine big-oh running times for algorithms.

7. Define binary relations and their properties using predicate calculus. Represent binary relations as ordered pairs, matrices, predicates, or graphs. Combine binary relations by union, intersection, and composition using matrix operations. Find the reflexive, symmetric, and transitive closures of a binary relation.

8. Describe and calculate permutations and combinations with and without replacement and with and without distinguishable objects. Describe and apply the pigeonhole principle.

9. Describe and determine the existence of Euler circuits and paths and Hamilton circuits and paths in graphs. Determine the minimum spanning tree of a graph. Construct and analyze Hasse diagrams for partially ordered sets.

Course Structure

The course will meet each week, 002 for 2 lectures on T/Th, 001 for 3 lectures MWF.

The TAs will offer recitations as the room reservation is available on Fridays, 2-4 pm, EB2 rm 3211.

Course Policies

- It is important that you participate actively in this class. This means: posting to piazza, asking questions, being conscientious about important course dates, and contacting your instructor if you have special needs or concerns. We are all working together to learn.

- This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email team@piazza.com.

  Find our class page at: https://piazza.com/ncsu/fall2015/csc226001and002/home

- Homework due dates may be extended for special circumstances. Be sure to request these, if needed, before the due date.

- You will be allowed one chance to take a replacement test for ONE of the three tests at the end of the semester. If your grade is higher, it will replace your original test grade. If not, the new score will be disregarded.

- You will receive a guaranteed C in this course if you:
  - Submit all homeworks until you have received credit for at least 70% of the problems,
  - Take all tests and rework each problem until they are correct,
  - Work every special test problem until they are correct before the last day of class, AND
  - Take the computer lab.

Most students who perform each of these items will receive a B or better in the course.

Instructors

Dr. Tiffany Barnes (tmbarnes) - *Instructor*
Email: tmbarnes@ncsu.edu
Web Page: http://www4.ncsu.edu/~tmbarnes
Phone: 919-515-5764
Office Location: Engineering Building III (EB3) 2401
Office Hours:
Thursday: 2 - 3 pm

Aurora Liu (zliu24) - *Teaching Assistant*
Email: zliu24@ncsu.edu
Phone: 774-345-0373
Office Location: EB2 rm 1229B
Office Hours: See moodle link to office hours calendar on Moodle

Course Meetings

Lecture

Days: TH
Time: 3:50pm - 5:05pm
Campus: Centennial
Location: Hunt Library Auditorium for Section 002
This meeting is required.

Lecture

Days: MWF
Time: 9:35am - 10:25am
Campus: Centennial
Location: EB II Room 1025 for Section 001
This meeting is required.

Course Materials

Textbooks

Discrete Math zyBooks.com - *Sandy Irani*
Edition: July 2015
ISBN: n/a
Web Link: https://zybooks.zyante.com/#/zybook/NCSUCSC226Fall2015/
Cost: $40
This textbook is required.

Expenses

None.

Materials

WebAssign for HW submission - $22.95
This material is required.
Piazza for Class Discussion: https://piazza.com/ncsu/fall2015/csc226001and002/home - $0

This material is required.

Requisites and Restrictions

Prerequisites

MA 101 or equivalent completed in high school

Co-requisites

None.

Restrictions

CSC,CSU Majors and minors;CPE,CPU Majors

General Education Program (GEP) Information

GEP Category

Mathematical Sciences

GEP Category Outcomes

At the conclusion of this course, students should be able to

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8. Describe and calculate permutations and combinations with and without replacement and with and without distinguishable objects. Describe and apply the pigeonhole principle.

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How This Course Will Fulfill GEP Category Outcomes

Each outcome will be met through completing course homeworks, labs, and tests.

GEP Co-requisites

This course does not fulfill a General Education Program co-requisite.

Transportation

This course will not require students to provide their own transportation. Non-scheduled class time for field trips or out-of-class activities is NOT required for this class.

Safety & Risk Assumptions

None.

Grading

Grade Components

Component	Weight	Details
Homeworks	30	10 homeworks are given in the class. Homeworks will either be assigned through • zyBooks OR • The homeworks will be posted as "Practice Homework" documents that should be printed and worked by hand. To have these graded, the student should open webassign and use their previously worked homework as a source to enter answers into the corresponding questions.

		Homework extensions may be requested for any homework. Homework extensions will be for 3 days. Please request extensions before the deadline for a homework. If extensions are abused, we reserve the right to deduct a late penalty of 10% of the overall points available.
Labs and Tutorials	10	There are five software labs and tutorials students will use in this class: • Justified and Deep Thought Tutorials are written by Marvin Croy in UNC Charlotte's Philosophy Dept. He has provided "how-to preview" videos and links to these tutorials on his Philosophy Applets page. ◦ Justified Thought is a graphical tutorial for practicing logic rules. It requires Java and a web browser. (Preview here) ◦ Deep Thought is a graphical logic proof tutorial. NOTE: it does not allow you to skip any steps, such as double negation and commutative. It also makes liberal use of the Addition Rule. It requires Java and a web browser. Previews: ▪ Work Forwards (WF) ▪ Work Backwards (WB) ▪ WB with ADD ▪ Apply Replacement Rules • Additional labs will be linked on Moodle. Each lab should be completed by the assigned deadline. All problems assigned should be worked until all problems are correct. There is no penalty for reworking any portion of any lab/tutorial.
Tests (3 & Final Exam)	60	Three tests will be administered during class time, on paper. Each test has approximately 8-10 questions, with about 110 points available, but the score is counted out of 100, meaning there are typically 10 flexible extra credit points. The final exam will be held on Tuesday, December 17 from 1-4 pm.

Letter Grades

This Course uses Standard NCSU Letter Grading Scale

97	≤	A+	≤	100
93	≤	A	<	97
90	≤	A-	<	93
87	≤	B+	<	90
83	≤	B	<	87
80	≤	B-	<	83
77	≤	C+	<	80
73	≤	C	<	77
70	≤	C-	<	73
67	≤	D	<	70
63	≤	D+	<	67
60	≤	D-	<	63
0	≤	F	<	60

Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams and quizzes, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to http://policies.ncsu.edu/regulation/reg-02-20-15.

Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found at http://policies.ncsu.edu/regulation/reg-02-20-04.

Policies on Incomplete Grades

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at http://policies.ncsu.edu/regulation/reg-02-50-3.

Late Assignments

Students may request extensions (of a few days) on homeworks and labs/tutorials, which will be granted automatically for up to 3 requests that are made before the due date. No penalties will be assessed for the first three extensions. If further extensions are granted, they will be subject to a 10% penalty.

Assignments completed over 7 days after the deadline without an extension request will not be graded, unless the student schedules an appointment with the instructor and the two jointly agree to a makeup policy, that will then be recorded via email from the instructor to the student.

Attendance Policy

For complete attendance and excused absence policies, please see http://policies.ncsu.edu/regulation/reg-02-20-03

Attendance Policy

Attendance is required.

Absences Policy

Three absences will be excused for any reason. Beyond the first three absences, 3% of the student's final grade will be deducted per absence, unless the absences are discussed with the instructor and a mutually-agreed-upon strategy is determined.

Makeup Work Policy

Despite absences, all assignments shall be completed by the deadlines unless extensions are requested and granted before the assignment deadlines. Extenuating circumstances will be considered and all reasonable requests will be granted. If an absence occurs for a test/exam, advance notice must be given if it is possible. If it is not, an excuse should be provided and the exam should be made up as soon as possible.

Additional Excuses Policy

None.

Academic Integrity

Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at http://policies.ncsu.edu/policy/pol-11-35-01
None.

Academic Honesty

See http://policies.ncsu.edu/policy/pol-11-35-01 for a detailed explanation of academic honesty.
None.

Honor Pledge

Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

Electronically-Hosted Course Components

Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.
Electronically-hosted Components:

piazza.com
zyBooks.com
webassign.ncsu.edu
moodle.wolfware.ncsu.edu

Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office (http://www.ncsu.edu/dso), 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at http://policies.ncsu.edu/regulation/reg-02-20-01.

Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will

not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at http://policies.ncsu.edu/policy/pol-04-25-05 or http://www.ncsu.edu/equal_op/. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Course Schedule

NOTE: The course schedule is subject to change.

Logic & Proofs, Circuits — 08/19/2015 - 08/28/2015

Propositional Logic

Truth Tables

Proofs

Circuits

Multiplexers

Predicate Calculus

All reading & assignments information available on Moodle

Pre-Course Skills Test

Homework 1: Logic & Proofs

Homework 2: Circuits

Lab 1&2: Justified & Deep Thought

Predicate Calculus & Set Theory — 08/31/2015 - 09/16/2015

Predicate Calculus

Set Theory

Arithmetic Proofs

All reading & assignments information available on Moodle

Homework 3: Predicate Calculus

Test 1

Homework 4: Sets & Predicate Calculus

Induction & Recursion — 09/20/2015 - 10/15/2015

Arithmetic Proofs

Induction

Recursion

Big-O

All reading & assignments information available on Moodle

Homework 5: Sets, Arithmetic Proofs, Induction (Due 9/27)

FALL BREAK - NO CLASS (10/10)

Homework 6: Induction, Recursion (Due 10/9)

Test 2

Big-O & Binary Relations — 10/18/2015 - 11/05/2015

Big-O

Binary Relations

Counting

All reading & assignments information available on Moodle

Homework 7: Big-O, Induction, Recursion

Homework 8: Binary Relations

Lab 4: Binary Relations

Counting — 11/08/2015 - 11/12/2015

Counting

Finite State Machines

Graph Theory

All reading & assignments information available on Moodle

Homework 9: Counting

Lab 5: Counting

Test 3

Graph Theory — 11/15/2015 - 11/26/2015

Graph Theory

Diagrams

All reading & assignments information available on Moodle

THANKSGIVING BREAK - NO CLASS

Homework 10: Graphs, Hasse Diagrams

Final Exam — 12/10/2015 - 12/16/2015

FINAL EXAM Section 001 (Wed, 12/16, 8-11 am)

FINAL EXAM Section 002 (Thu, 12/10, 1-4 pm)