Course Information Handout
ECE 369 – Discrete Mathematics for Computer Engineering
School of Electrical and Computer Engineering
Purdue University
Fall 2024

1. **When and Where:** Tue and Thu 10.30 – 11.45, Forney G140

   - There will be 2 recitation sessions, each of 2 hours. You are encouraged to attend any one.
   - Days and times to be posted on the class website.

2. **Instructor**

   - **Name:** Professor Saurabh Bagchi
   - **Office, Phone, Email:** EE 325, 494-1741 (O), sbagchi@purdue.edu, Skype: saurabh_bagchi
   - **Office hours:** Wed 10.00-11.00, Fri 3.00-4.00
     If you find these hours insufficient or inconvenient for the level of help you need, I will be happy to set up appointment with you outside of these hours.

3. **Teaching Assistants**

   - Leonard Fan, fan316@purdue.edu
   - Ege Can Kaya, kayae@purdue.edu
   - Xinyu Zhang zhan5085@purdue.edu
   - **Office hours:** They will announce depending on your schedules
     If you find you cannot make it to these office hours, we will schedule separate times to discuss course topics with you.

4. **Course URL:** https://engineering.purdue.edu/ee369/

All in-class handouts will be made available on this web site. The handouts will include the Powerpoint slides used in class and lecture notes created in class. You will have the slide handouts available by 5 pm of the previous day and you can use this material to follow along in class. You will have the lecture notes available by 5 pm of the next day after the lecture.

5. Communication: We will use Piazza in the class for you to discuss technical topics amongst each other, to collaborate, and to learn together. The instructor or the TA will respond to questions on Piazza. However, for immediate questions, see us during office hours or after class.

The Piazza page is at:

https://piazza.com/purdue/fall2024/ece369/home

Access code: bglab

6. **Textbook:** Mathematical Structures for Computer Science, by Judith L. Gersting,

W H Freeman & Co, ISBN #0-7167-4358-2, **6th edition** (Other editions have slightly different material and different exercises)

7. **Exams:** There will be two evening midterm exams and one final exam.

The mid-term exams will be in the evening, on September 23 (Mon) and November 4 (Mon).

If you have a scheduling conflict, you should bring this to the notice of the instructor within 2 weeks of this announcement. Each midterm exam will cover material covered preceding the exam and what has not been covered in a prior exam, i.e., the 2nd mid-term exam is not comprehensive. The final exam will be comprehensive and cover the entire material taught during the semester. All the exams are closed book, closed notes, closed digital device. A handout is provided with the important terms and formulae. Each midterm exam will be a 60 minute exam, given in a 2 hour time slot. The final exam will be 2 hours.

8. **Grade Allocation:** 15% for the homeworks, 25% for each of two midterm exams, 30% for final exam, 5% for class participation. For class participation credit, you should do all of the following – submit your picture through electronic hand-in (homework 0), actively take part in the in-class discussions or recitation sessions, answer questions posed in class (through Brightspace, etc.), and participate in the online discussions on Piazza.

9. **Assignments:** We will have six written homework assignments through the semester, not counting the first warm-up exercise (see below). The assignments will be graded at a coarse level of granularity and the following grade assigned to each homework - check (made reasonable attempt on at least three-quarters of the questions), check plus (superior work on at least three-quarters of the questions), and check minus (did not turn in assignment, turned in missing or clearly incomplete solutions on more than one-quarter of the questions). We will take the best five homework submissions for grading. The solutions to the homework problems will be posted on Brightspace.

In the warm-up homework, we ask you to create a file with your name, a recent picture, and a short paragraph on what excites you as a Computer Engineer and what you want to get out of the class.

Homework is to be submitted electronically through Brightspace. Homeworks will be due 11.59 pm on the due date. Late electronically submitted homework will not be accepted. Failure to submit a homework

will lead to a check minus on the assignment. You will have at least 7 calendar days to do each homework (unless otherwise specified).

10. Course Description: This course introduces discrete mathematical structures and finite-state machines. You will learn how to use logical and mathematical formalisms to formulate and solve problems in computer engineering. Topics include formal logic, proof techniques, recurrence relations, sets, combinatorics, relations, functions, algebraic structures, and finite-state machines.

11. Course Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an ability to construct formal proofs in predicate logic.
2. an ability to construct informal proofs using a variety of mathematical techniques.
3. an ability to solve problems in combinatorics.
4. an ability to identify properties of mathematical relations.
5. an ability to identify properties of mathematical groups.
6. an ability to construct finite-state machines to recognize certain sets.

You must demonstrate *each* of these outcomes to pass this class. Each homework question and exam question will be labeled (possibly afterwards, not necessarily when you are solving the problem) as to what outcomes are being tested. In order to demonstrate competency in an outcome, you must score at least 50% on the exam questions on the outcome *or* get check or check plus on the homework questions on the outcome. If you are failing in any course outcome prior to the final exam, you will be notified before you take the final exam. This will give you a chance to focus on passing that course outcome in the final exam.

There is an outcome remediation policy that is available for the benefit of those students who have satisfactory performance in the course but would fail the course due to failure to satisfy any one of the course outcomes. This option is available to the students who would get a C or better in the course and have failed *only one* course outcome. The remediation is offered through an oral examination given by the instructor after the final examination. Details of the policy can be found in the document titled "Outcome remediation policy", which is available on the course web site.

12. Lecture Outline: The tentative outline for the number of lectures in the course is given along with the text book chapters they correspond to.

Lectures	**Topic**	**Text Book Chapter**

8	Propositional and Predicate Logic	Chapter 1
5	Program proofs	Chapter 1, 2
5	Induction	Chapter 2
3	Recursion and Recurrence Relations	Chapter 2
4	Sets and Combinatorics	Chapter 3
3	Relations	Chapter 4
3	Functions	Chapter 4
3	Algebraic Structures	Chapter 8
1	Computational Intractability	From Cormen, Leiserson, and Rivest
5	Finite-State Machines	Chapter 8
2	Evening midterm exams	
2	Review	
Total 44 lectures		

13. Active Learning Activity: We will use the fun and interesting method of "Active Learning Activity" (ALA) to aid in the learning process. Such activity comprises solving in class short and illustrative problems based on material covered in the previous few days' lectures. All the students present in class are encouraged to try solving the problem themselves, optionally using notes and books. Then the instructor will call upon one or more students to come up to the front of the class and write out the solution. Following this, the instructor will provide the correct solution if it has not been arrived at through the previous means. This process has been seen to substantially aid the students in absorbing the material and therefore everyone is encouraged to actively participate in it. The frequency of this activity will vary between one per lecture to one per week, depending on the difficulty level of the material covered in the lecture, and will occupy approximately 15 minutes of class time. Occasionally (approximately once a month), we will have an "Extreme Active Learning Activity" in which groups of students and will collaboratively work on the problems in the activity. The active learning activities will not be graded but will count toward the class participation grade.

If you wish to be excluded from being asked to come to the front of the class and solve any problem, please let the course staff know.

14. Regrade Requests. Exams and homeworks may be submitted for regrading up to one week after they are returned to the class. To request a regrade, write an explanation of your request on a separate sheet of paper and attach it to the homework or the exam, then give it electronically to the professor or the TA. This is the only process for requesting a regrade – an oral discussion is not acceptable. A regrade request may increase or decrease your grade.

15. Feedback. Professor Bagchi actively solicits positive and negative feedback from students throughout the course. If you have a complaint about how the course is taught or organized, constructive feedback on what would work better for you, or topics that you would want to see covered in the course, please send post the feedback *anonymously* through the following Google form: https://bit.ly/ece369feedback

The course staff will continuously make improvements to the class based on the feedback. In addition, at the end of each week, "mudboard cards" will be available for students to write down a topic they really liked and a topic that they could not understand among the topics covered that week. The students can then drop off the index cards as they exit the classroom.

16. Academic Integrity: We expect you to maintain the highest standard of academic honesty and integrity in your work in this class. Any actions that might unfairly improve a student's score on homework, quizzes, or examinations will be considered cheating and will not be tolerated. Any case of cheating will be reported to the Dean of Students and to the ECE Associate Head for Education. Unambiguous cases of cheating will result in an *F* for the course as will repeated suspect work. Allowing someone to cheat from your work is as serious a violation as cheating from someone else's work. We expect you to hold both your solution and our solution to each homework and exam in confidence and not to distribute these solutions *even after the end of the course*. Please take careful note of our policy on homework collaboration—cheating on homeworks will be considered just as serious as cheating on exams, and will result in failure in the course.

17. Written Homework: Discussion of and collaboration on homework problems is encouraged. You are free to work in groups as long as all group members are participating substantially in the solution of every problem. If you do not participate substantially, do not turn in that problem. Each individual must turn in their own assignment, written on their own in their own words, and is responsible for understanding that assignment. Importantly, no collaboration or discussion with others is allowed on a problem once you have begun writing your solution. You must write your own solution. It is considered cheating to turn in group product that you do not fully understand. Finally, you must acknowledge any collaboration by naming those you worked with, in your submission. Failure to acknowledge allowed collaboration is an academic integrity violation.

You are also required to protect your files against electronic copying using UNIX file protection, to not place your work on any publicly accessible site, and to exercise care in the disposal of any printouts of your work.

Created:
Saurabh Bagchi