

# **CSCI340 : Discrete Computational Structures**

## **Spring 2014**

**Class Time:** 3:00-4:15pm, Monday and Wednesday

**Credits:** 3 Cr.

**Instructor:** Yuni Xia ([yxia@cs.iupui.edu](mailto:yxia@cs.iupui.edu))

**Telephone:** 274-9738

**Office:** SL280E

**Office Hour:** Monday and Wednesday 2:00-3:00pm

**TA:** TBA

**Office:** Computer Science Conference Room SL280

**Office Hour:** Thursday 3-5pm

### **Textbook:**

Discrete Mathematics and Its Applications, by Kenneth H. Rosen, 7th edition, McGraw Hill,

### **Description:**

The purpose of this course is to understand and use (abstract) discrete structures that are backbones of computer science. In particular, this class is meant to introduce logic, proofs, sets, relations, functions, counting, and probability, with an emphasis on applications in computer science. Topics to be covered include:

- Logic: propositional logic, logical equivalence, predicates & quantifiers, and logical reasoning.
- Sets: basics, set operations
- Functions: one-to-one, onto, inverse, composition, graphs
- Integers: greatest common divisor, Euclidean algorithm.
- Sequences and Summations
- Mathematical reasoning and induction: Proof strategies, Mathematical Induction,
- Recursive definitions, Structural Induction
- Relations: Properties, Combining relations, Closures, Equivalence, Partial ordering
- Counting: basic rules, Pigeonhole principle, Permutations and Combinations, Binomial coefficients and Pascal triangle.
- Probability: Discrete probability. Expected values and variance.
- Graphs
- Trees

### **Grading Policy:**

**Assignments:** 30%

**Exam 1:** 20%

**Exam 2:** 20%

**Exam 3:** 30%

**Class Schedule:**

Week	Topics
1	Propositional Logic (1)
	Propositional Logic (2)
2	Propositional Logic(3), Predicate Logic(1)
	Predicate Logic(2)
3	Predicate Logic(3), Formal Proofs
	Proofs, Types of proofs
4	Sets, Sets operations
	Sets functions
5	Functions, Sequences
	Exam 1
6	Sequences, Summations
	Integers, Divisions
7	Integers, Divisions
	Integer algorithms, Modular Arithmetic
8	Mathematical Induction
	Recursion
9	Counting
	Counting, pigeonhole principle, permutations
10	Spring Break
	Spring Break
11	Combinations, Binomial Coefficient
	Exam 2
12	Counting with repetition, Probabilities
	Probabilities
13	Probabilities, Bayesian
	Relations
14	Relations
	Graphs
15	Graphs
	Trees
16	Trees
	Review

**Homework**

Assignments are due on the date indicated on the assignments. No late submissions will be accepted.

**Statements of Academic Integrity**

All submitted work must be your own contribution and nobody else's. Collaboration in homework and exams are not allowed.

Plagiarism is the use of the work of others without properly crediting the actual source. Using the work of other students, with or without their permission is plagiarism if there is no indication of the source of the original work. Plagiarism, a form of cheating, is a serious offense and will be severely punished. When plagiarism is suspected, the instructor will inform the student of the charge; the student has the right to respond to the allegations. Students whose work appears to be plagiarized may be asked to produce earlier drafts of work. Students should, for this reason and as a protection in cases of lost papers, retain rough drafts, notes, and other work products for 2 or 3 weeks after the end of each semester. The penalties for plagiarism include reprimands, receiving a failing grade for a particular take-home exam, paper, project, or the entire course, disciplinary probation, or dismissal. Faculty, after consulting with their chair and/or dean, must notify students in writing of their decision. Students have the right to appeal such decisions by submitting petitions. All students are responsible for reading the Code of Student Rights, Responsibilities, and Conduct of Indiana University Purdue University Indianapolis.