Portland State University
CS 251
Discrete Structures II
Winter Quarter 2014

CRN:	40963	Sec: 004
Time:	Monday	17:30 – 21:10
Location:	UTS 304	
Instructor:	Professor Bryant York	
Email:	york250@pdx.edu	
Office:	FAB 120-25	
Office Hours:	Monday 12:00 – 14:00	
Text:	(1) Theory and Problems of Discrete Mathematics (3nd Edition), Lipschutz and Lipson, Schaum's Outline Series, McGraw-Hill, New York, 1997. (**L&L**)	
	(2) Mathematical Structures for Computer Science (6th Edition), Judith L. Gersting, W. H. Freeman & Co., New York, 2007 **(GER)**	
	(3) A laptop computer will be required for some of the exercises.	

Catalog Description:
Continuation of CS 250. Logic: propositional calculus, first-order predicate calculus. Formal reasoning: natural deduction, resolution. Applications to program correctness and automatic reasoning. Introduction to algebraic structures in computing.

Goals: http://www.pdx.edu/computer-science/cs-251-discrete-structures-ii

Prerequisites:
- Grade of C or better in CS 250 – Discrete Structures I

Grading:

Laboratory/class work	30%
Quiz 1	10%
Quiz 2	10%
Quiz 3	10%
Final Examination	40%
Total	100%

Letter Grades:

Letter Grade	**Score Range**		C+	70 - 74
A	95 - 100		C	60 - 69
A-	90 - 94		D+	55 - 59
B+	85 - 89		D	50 - 54
B	80 - 84		D-	45 - 49
B-	75 - 79		F	< 45

Class/Lab Sessions

Date	Lab Topics	Readings due
1/6	Overview; **Review Sets, Relations, Induction Proofs** Propositional Calculus Propositions, truth tables, consistency, validity, tautology, contradiction	**L&L**: Ch. 4, Secs 4.1 – 4.9 **GER:** Ch. 1, pp. 1 - 34 **GER:** Sections 3.1,3.6,3.7,2.1,2.2,2.4
1/13	Introduction to Predicate Calculus, Quantification **Review Functions, Counting, Permutations, Proofs, Propositional Calculus**	**L&L:** Ch. 4, Secs 4.10 – 4.11 **GER:** Ch1. pp. 35-62 **GER:** Sections 3.2,3.3,3.4,4.4
1/20	**HOLIDAY**	
1/27	**Review Matrices, Probability, Proofs** **Review of Propositional and Predicate Logic** **Quiz 1** Intro to graph theory, graphs, multigraphs, digraphs, paths, connectivity, distance, diameter, regular, complete, bipartite, connected components	**L&L:** Ch. 8.1 – 8.8, **GER:** Ch. 5, pp. 401-450. **GER:** Sections 3.5,4.6
2/3	**Review of Matrices, Probability, Proofs** **Review of Graph Theory** **Review of Propositional and Predicate Logic** More graphs – Eulerian, Hamiltonian, labeled, weighted, planarity, isomorphism, BFS, DFS. Intro to Proofs. Proof strategies, Proofs involving negation and conditionals. Proofs without words.	**L&L:** Ch. 9.1 – 9.8 **GER:** Ch. 6, pp. 476 - 498
2/10	**Review of Vector and Matrices Proofs** **Review of Graph Theory** **Review of Propositional and Predicate Logic** **Quiz 2** Directed graphs and Binary Trees. Proofs involving quantifiers. More proofs without words.	**L&L:** Ch. 10.1 – 10.5 **GER:** Ch. 6, pp. 499-524
2/17	**Review of Graphs, Binary Trees** **Review of Propositional and Predicate Logic** **Intro to Boolean Algebra** Proofs involving conjunctions and biconditionals, Introduction to Languages, Grammars and Machines. Understanding False Proofs	**L&L** Ch. 15 **GER:** Ch. 7.1,7.2
2/24	**Review of Propositional and Predicate Logic** **Intro to Languages and Machines** **Quiz 3** Languages, Grammars, and Machines, DFA, TM Proofs involving disjunctions	**L&L:** Ch. 12, Ch. 13 **GER:** Ch. 8, pp. 618 – 645

3/3	**Review of Propositional and Predicate Logic, Graph Theory, Directed Graphs, and Binary Trees,** **Intro to Algebraic structures and Lattices** **Intro to Proofs of Correctness** Existence and Uniqueness Proofs	**L&L** Ch. 14 **GER:** Ch. 8.1 Ch. 2.3
3/10	**Review of Proofs and Prep for Final Exam** **Applications:** Huffman codes, Cryptography, Networks, Solving Recurrences	**GER:** Ch. 4.5, 5.4, 2.5
3/17	**Final Exam**	

Class/Lab Structure

- Review of Signaled Problems
- Overview lecture
- Individual Problem Solving
- Team Problem Solving
- Reinforcement Individual Problem Solving
- Individual Problem Construction
- Computational Considerations
- Challenge Problem Session

Signaling Procedure

- Student**s** may send an email to the instructor containing the chapter and number of the problem that he/she cannot understand or solve.
- A maximum of one problem per student can be submitted each week.
- As many problems as possible will be reviewed during the first 30 minutes of each class.

Class Participation

- 30% of the grade is allotted for class participation.
- Each class is worth 10 points.
- There is a deduction of 1 point for every minute that a student is late.
- Student must participate in the entire class to get full credit.
- There is a deduction of 1 point for every minute that a student leaves class early.
- Late or missed class points **cannot** be made up.

Extra Credit Problems

- From time to time extra credit problems may be posed during the Challenge portion of class.
- Extra credit problems may require computer programming.
- Extra credit cannot substitute for absence of base credit.
- Extra credit is used as a factor in deciding borderline grades.

Homework

HW1

1. Review L&L Chapter 11
2. Review L&L Chapter 4, Sections 4.1 – 4.10
3. Review Solved Problems 4.1 – 4.16
4. Read GER Introduction, Chapter 1, pp. 1 – 26
5. Review GER, Introduction Problems 1,3; Chapter 1, Sec 1.1, Ex 1,5

HW2

1. Review L&L Chapter 4, Sections 4.11 – 4.12
2. Review Solved Problems 4.17 – 4.21
3. Read GER Chapter 1, pp. 27 – 54, Chapter 2, pp. 55 – 73
4. Review GER, Chapter 1, Sec 1.2, Ex 1,5,7,9,11,14,16

HW3

1. Read L&L Chapter 8, Sections 8.1 – 8.7
2. Review Solved Problems 8.1 – 8.9
3. Read GER Chapter 2, pp. 74 – 83
4. Review GER, Chapter 1, Sec 1.3, Ex 1,3,5,7
5. Review GER, Chapter 1, Sec 1.4, Ex 1,4,8,10,12
6. Review GER, Chapter 1, Sec 1.5, Ex 1,4,6,8

HW4

1. Read L&L Chapter 8, Sections 8.8 – 8.12
2. Review Solved Problems 8.9 – 8.32
3. Read GER Chapter 2, pp. 84 – 107
4. Review GER, Chapter 2, Sec 2.1, Ex 1, 4, 7

HW5

1. Read L&L Chapters 9 and 10
2. Review Solved Problems 9.1 – 9.13, 9.15 – 9.19, 9.21
3. Review Solved Problems 10.1 – 10.4, 10.6 – 10.9, 10.17, 10.18
4. Read GER: Ch. 2, pp. 108 – 124
5. Review GER, Chapter 2, Sec 2.2, Ex 1,4,6,8,11

HW6

1. Read L&L Chapter 13, Sec 13.1 – 13.5
2. Review L&L Solved Problems 13.1 – 13.6, 13.8 – 13.17
3. Read GER: Ch. 2, pp. 125 – 135
4. Review GER, Chapter 2, Sec 2.3, Ex 1,4,8,11,13

HW7

1. Read L&L Chapter 13, Sec 13.6 – 13.7
2. Review L&L Solved Problems 13.18 – 13.36
3. Read GER: Ch. 2, pp. 136 – 146
4. Review GER, Chapter 3, Sec 3.1, 1,4,9,11,14

HW8

1. Read GER: Ch. 2, pp. 146 – 162
2. Review GER, Chapter 3, Sec 3.2, 1,5,8,11,14

HW9

1. Read GER: Ch. 2, pp. 146 – 162
2. Review GER, Chapter 3, Sec 3.3, 1,3,7,9,12,17,20,22,25
3. Review GER, Chapter 3, Sec 3.4, 1,4,7,9,12,15,17,21,23

Examinations:

All exams will be "closed book" and "closed notes", and will be administered in the classroom or in one or more alternate rooms that will be posted prior to the exam. Backpacks, cell phones, laptops, tablets and any other communications device cannot be used during the exam. Whether or not calculators will be allowed will be announced prior to each exam. Proper mathematical notation is required on solutions in quizzes, exams, and labs. Makeup exams will not be given except in cases of severe medical or family emergencies. If an emergency arises and you are going to miss an exam, contact the instructor **BEFORE** the exam to arrange for a special circumstance.

Workload

The normal workload required for success in this course is three (3) hours of preparation outside of class for each hour (1) of class.

Computing Resources

Computer programming is not required in this course; however, some students may wish to solve some of the challenge problems by writing computer programs. This is strongly encouraged but not required. Students may code problems in any language of their choice; however, if the student wishes to have their code graded for extra credit then it must be written in one of the following languages: C, C++, Java, or Haskell. The CS department's Solaris, Windows, and Linux machines will work fine for this. Your own home machine or laptop will probably work fine as well; however, your code must run on one of the CS Department's Solaris or Linux machines for grading purposes.

Students Requiring Accommodation:

If you are a student with a disability in need of academic accommodations, you should register with Disability Services for Students and notify the instructor immediately to arrange for special support and examination services.

Cheating:

Cheating of any kind is **unacceptable**! All written homework and programming projects are individual assignments. It is expected that each student will do his/her own work. It is permissible to discuss the assignments with other students, but each student must work out his/her own assignment solutions. The code turned in by a student must be his/her own. The penalty for cheating of any kind is a score of zero for the entire assignment or exam. Further

action by the appropriate academic disciplinary committees may also be undertaken. If you have any questions about what is or is not appropriate, please contact the instructor.

Staying In Touch

Keep an eye on the course web page for late-breaking announcements! Also, all students should subscribe to the course's mailing list cs250list@cs.pdx.edu; the subscription page for this list will be accessible from the course home page soon. The instructor will use this list to communicate important announcements, homework hints, etc.

Other Resources:

- *Discrete Structures, Logic, and Computability* by James L. Hein, Jones and Bartlett Publishers, 2010 (Third Edition)
- *REA Problem Solvers: Finite and Discrete Math*, (revised Edition) 1985.
- *Discrete Mathematics with Graph Theory*, (3rd Ed), E. Goudaire and M. Parmentter, Prentice-Hall, 2006.
- *Discrete and Combinatorial Mathematics*, R. P. Grimaldi, Addison-Wesley, 1985.
- Khan Academy videos: http://www.khanacademy.org/
- Proof Designer: http://www.cs.amherst.edu/~djv/pd/pd.html