FAYETTEVILLE STATE UNIVERSITY
College of Basic and Applied Sciences
Department of Mathematics and Computer Science
Fall 2010

I. Locator Information

Instructor: Dr. Vassil Yorgov
Course Number and Name: MATH150-01, Discrete Mathematics I
Semester Credit Hours: 3
Day and Time Class Meets: Monday, Wednesday, Friday 11:00 -11:50 p.m.
Total Contact Hours for Class: 45
Email address: vyorgov@uncfsu.edu
Office Location: SBE 342
Office hours: Monday and Friday 9-10:45 a.m., 1:30-3:45 p.m.
Office Phone: 672-1675

FSU Policy on Electronic Mail: Fayetteville State University provides to each student, free of charge, an electronic mail account (username@uncfsu.edu) that is easily accessible via the Internet. The university has established FSU email as the primary mode of correspondence between university officials and enrolled students. Inquiries and requests from students pertaining to academic records, grades, bills, financial aid, and other matters of a confidential nature must be submitted via FSU email. Inquiries or requests from personal email accounts are not assured a response. The university maintains open-use computer laboratories throughout the campus that can be used to access electronic mail.

Rules and regulations governing the use of FSU email may be found at http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf

II. Course Description

The first course of a two-semester sequence in discrete mathematics, providing the theoretical base and support for computer science and including operations on sets, Cartesian products and tuples, combinatorial objects, Venn diagrams, event spaces and basic probability, number systems, the statement calculus, rules of inference and validity of arguments, inductive proofs, the concept of an algorithm, equivalence relations, partial ordering relations, graphs and digraphs as relations, including trees and shortest paths in digraphs, basic definitions and notations of functions, recurrences for the analysis of algorithms, semigroup and Abelian group, matrix operations, invertibility, and solutions of systems of linear equations. *Prerequisite: MATH 129 and 130 or MATH 131.*

III. Disabled Student Services

In accordance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act of 1990, if you have a disability or think you have a disability to please contact the Center for Personal Development in the Spaulding Building, Room 155 (1st Floor); 910-672-1203.

IV. Textbook

Johnsonbaugh, Richard, Discrete Mathematics (7th ed) Upper Saddle River: Prentice-Hall, 2009

V. Student Learning Outcomes

Upon the completion of this course, the student shall be able to:

1. Implement the notions of prepositional and predicate logic.
2. Apply direct and indirect proofs to prove propositions.
3. Determine validity of an argument and to apply the rules of inference.
4. Apply mathematical induction.
5. Employ the concept of a function as a special case of a binary relation.
6. Classify a given binary relation on a set as being an equivalence relation, a partial order or neither.
7. Construct a partition given an equivalence relation on a set.
8. Use different number systems.
9. Employ the notions of an algorithm, recursive algorithm, and complexity of an algorithm.
10. Apply different counting methods using permutations and combinations.
11. State the basic concepts of discrete probability.
12. Solve second-order linear homogeneous recurrence relations with constant coefficients.
13. Apply recurrence relations to the analysis of algorithms.

14. Recognize paths, cycles, and Euler cycles in a graph.

Course Competencies

Dpi Standards

The DPI standards covered are listed below. Students shall:

8.1 Know the symbolism of Mathematical logic.
8.2 Demonstrate a thorough knowledge of the concepts of equivalence and implication.
8.5 Posses a thorough knowledge of the role of proof in the study and development of mathematics.
8.6 Create original proofs in the various branches of mathematics including direct proofs, indirect proofs, and proofs using mathematical induction.
8.7 Understand recursive definition of sequences and functions, and use recursion and technology to model and study the properties of real world processes.
9.1 Use the set theoretic operations: union, intersection, and complementation.
9.3 Demonstrate a thorough knowledge of the concept of a set theoretic relation.
9.4 Demonstrate a thorough knowledge of the concept of a function including knowledge of the concepts: range, domain, one-to-one, into, onto, and inverse.

Ncate Standards

The NCATE Standards covered in this course are listed below.

1.1 Programs prepare prospective teachers who:
  1.1.1 Use a problem-solving approach to investigate and understand mathematical content.
  1.1.2 Formulate and solve problems from both mathematical and everyday situations.
  1.2.1 Communicate mathematical ideas in writing, using everyday and mathematical language, including symbols.
  1.2.2 Communicate mathematical ideas orally, using both everyday and mathematical language.
1.3 Programs prepare prospective teachers who can make and evaluate mathematical conjectures and arguments and validate their own mathematical thinking.
1.4 Programs prepare prospective teachers who:
  1.4.1 Show an understanding of the interrelationship within mathematics.
  1.4.2 Connection of mathematics to other disciplines and real-world situations.
1.5 Programs prepare prospective teachers who:
  1.5.1 Understand and apply of concepts of number, number theory, and number systems.
1.6 Programs prepare prospective teachers who:
  1.6.1 Use of calculators in computational and problem-solving situations.
  1.6.2 Use computer software to explore and solve mathematical problems.

VI. Course Requirements and Evaluation Criteria

The practice problems provided in the schedule below are designed to engage students in active learning and enhance their understanding of the material. Students are expected to work on the problems outside class and to participate in the discussion during the next class period.

Homework will be assigned in addition and will be collected regularly according to the schedule. There will be three tests, and a comprehensive final exam. The lowest test score will be dropped. The weight given to various activities for evaluation is as follows: **tests-50%, final exam-20%, homework-20%, participation – 10%.** The grading scale for determining the course grade is given below. In order to show how a course grade will be calculated, suppose a student has 75, 89, and 94 on the tests, 93 for participation, 88 on the final exam, and 92 on the homework. The student grade will be calculated as follows:

0.5 x [(89+94) / 2] +0.1x93+ 0.2 x 88 + 0.2 x 92= 91.1 and the student will receive a grade of A for the course.

Grading Scale:

A 90 - 100%	B 80 - 90%	C 70 - 80%	D 60 - 70%	F Below 60%

There is a 10% penalty a day for a late homework assignment. Late homework will no longer be accepted after it has been graded and returned to class.

VII. Academic Support Resources

Students are encouraged to use the Blackboard Learning System where lecture notes, solutions to problems, and other materials will be posted. Students are encouraged to seek the instructors help during the office hours on topics they find difficult to understand. In addition tutoring is available in the University College Learning Center located in room 216-C of Helen T. Chick Building.

VIII. Course Outline and Assignment Schedule

In case FSU must close for an emergency during the semester, instruction will continue using Blackboard.

Date	**Topics and Practice Problems**
08.20	Propositions
	Page 20 Problems: 5, 7, 20, 23, 45.
08.23	Conditional Propositions and Logic Equivalence
	Page 30 Problems: 3, 17, 20, 27, 51, 64, 67.
08.25	Quantifiers
	Page 50 Problems: 1, 6, 11, 31, 37, 53.
08.27	Nested Quantifiers
	Page 58 Problems: 12, 14, 38, 44, 49, 59.
08.30	Arguments. Proofs
	Page 36 Pr: 11, 12, 14; Page 75 Problems: 9, 16; Page 86 Pr: 22.
09.01	Resolution Proofs
	Page 93 Problems: 2, 3, 6.
09.03	Mathematical Induction
	Page 102 Problems: 6, 22, 28.
09.08	Sets
	Page 12 Problems: 1, 2, 3, 5, 14, 15, 43, 46.
09.10	Functions
	Page 132 Problems: 3, 5, 24, 33, 39, 67.
09.13	**Homework 1 due**
09.15	Sequences and Strings
09.17	Page 145 Problems: 9, 11, 74, 75, 76, 116, 119, 121.
09.20	Review
09.22	**Test1**
09.24	Relations
	Page 157 Problems: 2, 5, 6, 10, 21, 28, 36.
09.27	Equivalence Relations
09.29	Page 164 Problems: 2, 4, 6, 16, 24, 27.
10.01	Matrices of Relations
	Page 172 Problems: 3, 6, 8, 9, 15, 17.
10.04	**Homework 2 due** 4.1. Introduction to Algorithms
	Page 185 Problems: 5, 6, 8, 11, 12.
10.06	4.2. Examples of Algorithms
	Page 192 Problems: 2, 3, 6, 9.
10.08	4.3. Analysis of Algorithms
10.11	Page 207 Problems: 3, 4, 10, 14, 17, 18.
10.13	4.4. Recursive Algorithms
10.20	Page 219 Problems: 1, 5, 8, 10.
10.22	Review
10.25	**Test2**
10.27	5.1. Divisors
	Page 233 Problems: 5, 14, 16, 23.
10.29	5.2. Representations of Integers and Integer Algorithms
	Page 247 Problems: 5, 7, 8, 10, 14, 23, 30, 38.
11.01	5.3. The Euclidean Algorithm
	Page 258 Problems: 3, 7, 9, 12, 23.

11.03	6.1. Basic Counting Principles Page 274 Problems: 5, 20, 21, 32, 35.
11.05	6.2. Permutations and Combinations Page 288 Problems: 5, 6, 8, 12, 26, 29, 34. Algorithms for Generating Permutations and Combinations Page 304 Problems:
11.08	Introduction to Discrete Probability Page 307 Problems: 2, 6, 13, 19, 21.
11.10	**Homework 3 due** 6.6 (6.3) Generalized Permutations and Combinations Page 298 Problems: 2, 3, 8, 10, 17, 22, 23.
11.12	6.7. Binomial Coefficients and Combinatorial Identities Page 324 Problems: 2, 3, 5, 10, 11, 18.
11.15	Review
11.17	**Test3**
11.19	7.1. Introduction to Recurrence Relations Page 342 Problems: 2, 9, 10, 11, 12, 10, 20.
11.22	7.2. Solving Recurrence Relations Page 356 Problems: 3, 4, 8, 16, 18, 20
11.24	7.2. Solving Recurrence Relations
11.29	7.3. Applications to the Analysis of Algorithms Page 371 Problems: 33, 34, 35, 36.
12.01	**Homework 4 due** 8.1. Introduction to Graphs 8.2. Paths and Cycles
12.03	Review **Comprehensive Final Exam.** The date will be posted soon at:

http://www.uncfsu.edu/registrar/

***Note**: The above tentative schedule is subject to change per instructor's notice*.

IX. Teaching Strategies

The teaching strategies for this course involve lectures, discussion, homework, tests, and final examination.

X. References

Goodaire, Edgar G., Parmenter, Michael M., Discrete Mathematics with Graph Theory, 3nd ed. Upper Saddle River: Prentice-Hall, 2006

Gossett, Eric, Discrete Mathematics with Proofs, Upper Saddle River: Prentice-Hall, 2003

Ross, Kenneth A., Wright, Charles R.B., Discrete Mathematics. 5th ed. Upper Saddle River: Prentice-Hall, 2003