DePAUL UNIVERSITY
COLLEGE OF COMPUTING AND DIGITAL MEDIA

CSC400-201/210 Discrete Structures for Computer Science

SYLLABUS

Quarter: Summer I, 2018
Class time: MW 5:45 – 9:00
Location: CDM 222
Instructor: Vladimir Lepetic
Office: 1650 Lewis, LC; **Phone:** (312) 362-6250
e-mail: vlepetic@depaul.edu
Office Hours: MW 5:00 – 5:45

TEXT: Epp, S., *Discrete Mathematics with Applications*, 4th ed. Brooks/Cole Publishing, 2011. ISBN 978-0495391326

COURSE DESCRIPTION:

CSC400 is intended to provide a solid foundation for further study of mathematics and computer science.
The course introduces the basic principles of logical reasoning and abstract mathematics and shows how to apply them to explore, formulate and establish truth and falsity for elementary statements in mathematics and computer science. In addition, it extends the development of reasoning skills needed for studies of a variety of the mathematical structures that are needed for advanced mathematics and computer science.
The topics covered include: logic and set theory, relations, functions, graphs, and counting and probability.

CONTENTS

6.2 Properties of Sets
6.3 Disproofs, Algebraic Proofs, and Boolean Algebras
6.4 Russell's Paradox and the Halting Problem

6.1 – 6.4 Exercises/Discussion

II The Logic of Compound Statements (Ch. 2.1 – 2.4)

2.1 Logical Form and Logical Equivalence
2.2 Conditional Statements
2.3 Valid and Invalid Arguments
2.4 Application: Digital Circuits

2.1 – 2.4 Exercises/Discussion

III The Logic of Quantified Statements (Ch. 3.1 – 3.4)

3.1 Predicates and Quantified Statements I
3.2 Predicates and Quantified Statements II
3.3 Statements with Multiple Quantifiers
3.4 Arguments with Quantified Statements

3.1 – 3.4 Exercises/Discussion

IV Elementary Number Theory and Methods of Proof (Ch. 4.3 – 4.7)

4.1 Direct Proof and Counter Example I – IV
4.2 Indirect Argument: Two Classical Theorems

4.1 – 4.7 Exercises/Discussion

V Sequences, Mathematical Induction and Recursion (Ch. 5.1 – 5.9)

5.1 Sequences
5.2 Mathematical Induction I – II
5.3 Strong Mathematical Induction
5.4 Defining Sequences Recursively
5.5 Solving Recurrence Relations by Iteration
5.6 Second-Order Linear Homogeneous Recurrence Relations (*)
5.7 General Recursive Definitions and Structural Induction (*)

5.1 – 5.9 Exercises/Discussion

VII Functions (Ch. 7.1 – 7.4)

7.1 Functions Defined on General Sets
7.2 One-to-One and Onto, Inverse Functions
7.3 Composition of Functions
7.4 Cardinality with Applications to Computability (*)

7.1 – 7.4 Exercises/Discussion

VIII Relations (Ch. 8.1 – 8.5)

8.1 Relations on Sets
8.2 Reflexivity, Symmetry and Transitivity
8.3 Equivalence Relations
8.4 Modular Arithmetic with Application to Cryptography (*)
8.5 Partial Order Relations (*)

8.1 – 8.5 Exercises/Discussion

IX Counting and Probability (Ch. 9.1 – 9.7) (*)

9.1 Introduction
9.2 Possibility Trees and the Multiplication Rule
9.3 Counting Elements of Disjoint Sets: The addition Rule
9.4 The Pigeonhole Principle
9.5 Counting Subsets of a Set: Combinations
9.6 r-Combinations with Repetition
9.7 Pascal's Formula and Binomial Theorem

9.1 – 9.7 Exercises/Discussion

X Graphs and Trees (Ch. 10.1 – 10.3) (*)

10.1 Graphs: Definitions and Basic Properties
10.2 Trails, Paths and Circuits
10.3 Matrix Representation of Graphs

10.1 – 10.3 Exercises/Discussion

(*) Optional and/or time permitting

This is a fast-paced course that requires you to set aside adequate time for practice. **It is highly recommended** that you practice three or more times per week. Doing well in this course usually requires at least **6-10** hours per week of practice, depending on your current skill level. If you start to fall behind, for whatever reason, you should contact me as soon as possible to determine what can be done to rectify matters. Usually, something can be done to help you if you give me enough advance notice.

HOMEWORK:

Four sets of homework problems/"Self-Tests" will be given and will be solved in class a week after the assignment during regular problem sessions. However, **students are strongly urged to attempt problems by themselves and ask about or discuss those they couldn't do, in class or in private.**

EXAMS:

There will be two in class exams – a mid-term and the final – and one take-home exam. The grade will be calculated as follows: mid-term: 35%, take-home: 15%, and final 50%.. In order to get full credit for exam problems, students have to show **ALL WORK!** Make-up exams **will not be given.**

Schedule of Exams:

Midterm: June 27, at 5:45.

Take-home will be handed out on July 9 and it's due on July 11, at 5:45pm.

Final Exam: July 11, at 5:45pm

Grade scale: 90-100% (A), 90-80% (B), 70-80% (C), 60-70% (D), below 60% (F)

Course Policies

Changes to Syllabus

This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, posted under Announcements in D2L and sent via email.

Online Course Evaluations

Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the

students. They are a requirement of the course and are key to continue to provide you with the highest quality of teaching. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation. Please see https://resources.depaul.edu/teaching-commons/teaching/Pages/online-teaching-evaluations.aspx for additional information.

Academic Integrity and Plagiarism
This course will be subject to the university's academic integrity policy. More information can be found at https://offices.depaul.edu/oaa/faculty-resources/teaching/academic-integrity/Pages/default.aspx.

Academic Policies
All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the University Academic Calendar. Information on enrollment, withdrawal, grading and incompletes can be found at: http://www.cdm.depaul.edu/Current%20Students/Pages/PoliciesandProcedures.aspx

Incomplete Grades
An incomplete grade is a special, temporary grade that may be assigned by an instructor when unforeseeable circumstances prevent a student from completing course requirements by the end of the term and when otherwise the student had a record of satisfactory progress in the course. All incomplete requests must be approved by the instructor of the course and a CDM Associate Dean. Only exceptions cases will receive such approval. Information about the Incomplete Grades policy can be found at http://www.cdm.depaul.edu/Current%20Students/Pages/Grading-Policies.aspx

Students with Disabilities
DePaul University is committed to ensuring equal access to its educational and extracurricular opportunities for students with disabilities. The Center for Students with Disabilities (CSD) offers reasonable academic accommodations and services to support our students. We also serve as a resource to the many university departments that have a responsibility to accommodate students.
Please see https://offices.depaul.edu/student-affairs/about/departments/Pages/csd.aspx for Services and Contact Information.

Proctored exams for OL courses (if applicable)
If you are an online learning student living in the Chicagoland area (within 30 miles of Chicago), you will need to come to one of DePaul's campuses to take an exam. Online learning students outside of the Chicagoland area are required to locate a proctor at a local library, college or university. You will need to take the exam within the window your instructor gives. Students should examine the course syllabus to find exam dates and the instructor's policy on make-up exams. Detailed information on proctored exams for online learning students can be found at http://www.cdm.depaul.edu/onlinelearning/Pages/Exams.aspx