Department of Mathematics & Statistics

MATH 251/COSC 221
Introduction to Discrete Structures
FALL 2022

Professor Information

Professor:	Julian Buck
Campus:	Kelowna
Office:	C104E and Online
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Office Hours:	Mon/Wed 9:00-10:00, Tues/Thur 11:00-12:00, and online by appointment

Section Information

Section:	001		
Class Times:	Mon	12:30 - 1:50	E303
	Wed	12:30 - 1:50	E303
	Fri	1:00 - 1:50	E303

Calendar Description

Math 251-3-4
Introduction to Discrete Structures
This course is an introduction to sets, logic, combinatorics and graph theory, as applied in computing: sets and propositions, permutations and combinations, graphs and trees, Boolean algebra, algorithms and applications. This course is also offered as COSC 221. Students with credit for COSC 221 cannot take MATH 251 for further credit. (4,0,0)

Prerequisites:

- MATH 112 or MATH 139 or MATH 147 or MATH 149 or MATH 221 or MATH 314

Transfer Information

Please refer to the transfer guide, available online at http://www.bctransferguide.ca. Students are encouraged to save a copy of current transfer information for their own records.

Course Materials

The required text for this course is:

Mathematical Structures for Computer Science $7E$ by *Judith L. Gersting*, 2014

Course Content

Below you will find a synopsis of probable course content.

Chapter 1: Formal Logic

§	CONTENT	EXAMPLE QUESTIONS
1.1	Statements, Symbolic Representation, and Tautologies	1, 5, 7, 11, 15, 17, 25, 30, 39
1.2	Propositional Logic	5, 10, 13, 15, 23, 27, 43, 53
1.3	Quantifiers, Predicates, and Validity	1, 3, 5, 7, 15, 17, 19
1.4	Predicate Logic	7, 9, 15, 21, 25, 27

Chapter 2: Proofs, Induction, and Number Theory

§	CONTENT	EXAMPLE QUESTIONS
2.1	Proof Techniques	3, 5, 9~71 odds
2.2	Induction	1~57 odds
2.3	More on Proof of Correctness	3, 5, 7, 9, 11, 13, 14
2.4	Number Theory	3, 5, 7, 9, 13, 15, 33, 39

Chapter 3: Recursion, Recurrence Relations, and Analysis of Algorithms

§	CONTENT	EXAMPLE QUESTIONS
3.1	Recursive Definitions	5, 9, 15, 19, 39, 47, 57
3.2	Recurrence Relations	5, 9, 15, 23, 31

Chapter 4: Sets, Combinatorics, and Probability

§	CONTENT	EXAMPLE QUESTIONS
4.1	Sets	1~77 odds
4.2	Counting	1~71 odds
4.3	Principles of Inclusion and Exclusion: Pigeonhole Principle	1~23 odds
4.4	Permutations and Combinations	1~87 odds
4.5	Binomial Theorem	1~13 odds
4.6	Probability	1~21 odds

Chapter 5: Relations, Functions, and Matrices

§	CONTENT	EXAMPLE QUESTIONS
5.1	Relations	3, 7, 9, 11, 17, 21, 23, 31
5.4	Functions	1~23 odds

Chapter 6: Graphs and Trees

§	Content	Example Questions
6.1	Graphs and Their Representations	3, 7, 9, 17, 21
6.2	Trees and Their Representations	3, 5, 7, 9, 11

Chapter 8: Boolean Algebra and Computer Logic

§	Content	Example Questions
8.1	Boolean Algebra Structure	1, 5, 15, 17

Learning Outcomes

The following are the anticipated learning outcomes of the course.

1. Determine the truth value of a well-formed formula (WFF).
2. Prove whether or not an argument is valid.
3. Translate arguments from natural language to symbolic form and vice-versa.
4. Simplify WFF's involving quantifiers and predicates using derivation rules.
5. Construct simple direct and indirect proofs as well as proofs by induction.
6. Determine the nth term in a recursively defined sequence.
7. Solve a first order and second order recurrence relation.
8. Simplify set theory expressions using set identities.
9. Use the multiplication and addition principles to solve applied problems.
10. Use the binomial theorem, the principle of inclusion and exclusion and the pigeonhole principle to solve applied problems.
11. Determine basic properties of relations and functions.
12. Determine basic properties of a graph.
13. Use basic tree traversal algorithms to represent trees.

Course Evaluation

Your grade in this course will be broken down as follows:

Written Homework	30%
Tests (3)	30%
Final Exam	40%
Total	100%

- **Homework** will be assigned on a roughly weekly basis in the form of worksheets that will be distributed in class and posted on Moodle.
- **Tests** will occur 3 times during the semester, with each test counting for 10% of your final grade. Details regarding tests, including the tentative test dates, will be given on the course Moodle page.
- **The Final Exam** will be cumulative and held at a date and time set by the college. The final exam schedule is generally made available approximately half way through the semester. Details about the final exam format will be given on the course Moodle page.

Department Policies

- All written assignments are due at the start of class. All assignments not handed in within the first five minutes of class will be assigned a grade of zero.

- The math department does not give make-up exams nor does the department allow students to write exams out of time without a valid medical or compassionate reason.

- It is expected the student attends all classes. If a student misses a class, it is the student's responsibility to get the material covered in class from their peers.

- No students may change sections of a course after the final add/drop date. If students wish to switch sections after the first day of class but before the final add/drop date, they should consult the chair of the Math department in order to not lose grade progress.

- Failure to achieve a grade of at least 45% on the final exam of a course will result in a failing grade for the course.

- When a student fails a course as a result of failing to achieve a final exam grade of 45%, the maximum grade that will be awarded is 49%.

- Calculators used for exams will satisfy the department's calculator policy. For math 251, students are allowed a non-programmable, non-graphing scientific calculator. Graphing calculators are permitted at discretion of instructor.

- A formula sheet will be provided for this course.

- The final exam for this course shall be cumulative.

Important Dates

Statutory Holiday (no classes)	Mon., Sep. 5
Orientation day (no classes)	Tue., Sep. 6
Classes begin	Wed., Sep. 7
Last day to register	Fri., Sep. 16
Last day to receive a refund for course drop	Fri., Sep. 16
Last day to drop a course without a withdrawal being recorded on the student's record	Fri., Sep. 16
Statutory Holiday (no classes) - if provincially mandated	Fri., Sep. 30
Statutory Holiday (no classes)	Mon., Oct. 10
Last day to withdraw without academic penalty	Fri., Oct. 28
Statutory Holiday (no classes)	Fri., Nov. 11
Last day of classes	Tue., Dec. 6
Final exam period	Thu., Dec. 8 - Mon., Dec. 19

Okanagan College Policies

Final Exam Policy: The procedures relating to final exams are significantly different than those that involve midterms. Final exam policy is determined by the college and a much more formal process is invoked should a student be unable to write the final exam. It is stated in the final exam policy that student travel plans are not a valid reason for writing an out-of-time final exam. As such, it is essential that you do not make travel plans prior to the final exam schedule being posted. The full final exam policy can be found at the following link.

http://webapps-5.okanagan.bc.ca/ok/Calendar/Examinations

The final exam schedule is determined by the Office of the Registrar and posted at the following link sometime around the middle of the semester.

Academic Integrity Policy: Okanagan College requires that all students are informed of the Academic Integrity Policy included in the College Calendar which can be found at the following link:

http://webapps-5.okanagan.bc.ca/ok/Calendar/AcademicIntegrity

College Student Conduct Policies: Okanagan College requires that students are informed of acceptable Student Conduct Policies included in the College Calendar which can be found at the following link:

http://webapps-5.okanagan.bc.ca/ok/Calendar/StudentConduct

Student Advising & Counselling

Accessibility Services collaborates with the academic departments of the college to arrange appropriate accomodation for students with a disability. If you require academic accomodation, please contact disability services. Contact, and other relevant information, can be found at:

https://www.okanagan.bc.ca/accessibility-services

Counselling Services has professionally trained staff that are available to assist students in coping with problem areas in their life (including: personal & career counselling, study skills) that interfere with maximizing their academic and social potential. For more information visit:

http://www.okanagan.bc.ca/counselling-services