CAPILANO UNIVERSITY

TERM: Fall 2020	COURSE NO: MATH 336	
INSTRUCTOR: TBA	COURSE TITLE: Applied Graph Theory and Optimization	
OFFICE: LOCAL: E-MAIL: @capilanou.ca	SECTION NO(S):	CREDITS: 3.0
OFFICE HOURS:		
COURSE WEBSITE:		

Capilano University acknowledges with respect the Lil'wat, Musqueam, Squamish, Sechelt, and Tsleil-Waututh people on whose territories our campuses are located.

COURSE FORMAT
Three hours of class time, plus an additional hour delivered through on-line or other activities for a 15-week semester, which includes two weeks for final exams.

COURSE PREREQUISITES
45 credits of 100-level or higher coursework including MATH 124

CALENDAR DESCRIPTION
Students will examine and develop discrete models and linear programs as they relate to problems found in the physical, biological and social sciences. This includes shortest paths, matchings, graph colouring and network flows. Students will apply the simplex method and duality theory to find optimal solutions to the associated linear programs.

COURSE NOTE
MATH 336 is an approved Science and Technology course for Cap Core requirements.
MATH 336 is an approved Science course.
MATH 336 is an approved Quantitative/Analytical course for baccalaureate degrees.

REQUIRED TEXTS AND/OR RESOURCES

- Linear Programming and Network Flows, Bazarra, Jarvis and Sherali
- Graph theory and its Applications, Gross, Yellen, Chapman and Hall

COURSE STUDENT LEARNING OUTCOMES
On successful completion of this course, students will be able to do the following:

- Interpret applied problems using a variety of graph theoretic models, including shortest path, matchings, graph colouring and network flows.

- Transform discrete optimization problems to an equivalent linear program or integer linear program.
- Apply the simplex method to find optimal solutions to linear programs.
- Apply a variety of algorithms to find optimal solutions to graph theory optimization problems (Kruskal's, Prim's, Greedy, etc).
- Prove the correctness of algorithms.
- Construct the dual of a linear program.
- Interpret the solution to the dual of a linear program in terms of the original problem.

Students who complete this Science and Technology course will be able to do the following:

- Apply numerical and computational strategies to solve problems
- Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information)
- Demonstrate how a problem, concept, or process can be modelled numerically, graphically, or algorithmically
- Participate in scientific inquiry and communicate the elements of the process, including making careful and systematic observations, developing and testing a hypothesis, analyzing evidence, and interpreting results

COURSE CONTENT

Topics	# of Weeks (Approx.)
Graph Theory (matchings, colourings, directed graphs)	3
Linear Programs and Integer Linear Programs	2
The Simplex Method	3
Duality Theory	2
Applications	2
Projects and/or Testing	1
Final exam period	2

EVALUATION PROFILE

Term Work	55%-65%
Final Exam	25%-35%
Personal Evaluation	10%
Total	100%

Term work will consist of tests, quizzes, projects and/or assignments. While the weighting of individual tests, etc. is at the discretion of the instructor, no single test will exceed 35% of the final total. The weight of the different components comprising term work will be announced in class in advance.

Specific dates and details regarding the Evaluation Component will be provided by the instructor.

PERSONAL EVALUATION

In the absence of exceptional circumstances, which are determined at the instructor's discretion, the personal evaluation component of the final grade will be pro-rated to the rest of the grade. For example, a 10% personal evaluation component would be determined by dividing the remaining mark out of 90 by 9. The most common circumstance justifying an increased personal evaluation mark is a student's improved performance in the final examination relative to the term work, which the instructor feels justifies an elevated letter grade.

GRADING PROFILE

A+ = 90-100	B+ = 77-79	C+ = 67-69	D = 50-59
A = 85-89	B = 73-76	C = 63-66	F = 0-49
A- = 80-84	B- = 70-72	C- = 60-62	

Incomplete Grades

Grades of Incomplete "I" are assigned only in exceptional circumstances when a student requests extra time to complete their coursework. Such agreements are made only at the request of the student, who is responsible to determine from the instructor the outstanding requirements of the course.

Late Assignments

Assignments are due at the beginning of class, unless otherwise announced. Late assignments may receive a grade of zero.

Missed Exams/Quizzes/Labs etc.

A score of zero will be assigned unless the student meets all of the following conditions:

1. Circumstances clearly beyond the control of the student caused the exam, test, quiz, lab, etc. to be missed. Such circumstances include serious illness or injury, or death of close family member. They do not include forgetting about the test, lack of preparation for the test, work-related or social obligations.

2. The student has notified the instructor (or the School of STEM office staff, if the instructor is not available) that they will miss the exam, test, quiz, lab, etc. Such notification must occur in advance, if possible, or at the latest, on the day of the exam, test, quiz, lab, etc.

3. Proof of the circumstances is provided. Proper proof of illness or injury requires a medical certificate from a doctor.

4. The student has been fully participating in the course up until the circumstances that prevented the writing of the exam, test, quiz, lab, etc. Fully participating means attending almost all of the classes and turning in almost all assignments in the course.

The options for making up any missed grades offered to the student who meets the four conditions are decided by the instructor. They will not necessarily meet the convenience of the student. Make-up exams, quizzes and/or tests are given at the discretion of the instructor. They are generally given only in medical emergencies or severe personal crises. Some missed labs or other activities may not be able to be accommodated. Please consult with your instructor.

Attendance
Students are expected to attend all classes and associated activities.

English Usage
Students are expected to proofread all written work for any grammatical, spelling and stylistic errors. Instructors may deduct marks for incorrect grammar and spelling in written assignments.

Electronic Devices
Students may use electronic devices during class for note-taking, calculations and in-class research.

On-line Communication
Outside of the classroom, instructors will (if necessary) communicate with students using either their official Capilano University email or Moodle; please check both regularly. Official communication between Capilano University and students is delivered to students' Capilano University email addresses only.

UNIVERSITY OPERATIONAL DETAILS

Tools for Success
Many services are available to support student success for Capilano University students. A central navigation point for all services can be found at: https://www.capilanou.ca/student-life/

Capilano University Security: download the [CapU Mobile Safety App](#)

Policy Statement (S2009-06)
Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Academic Integrity, Academic Probation and other educational issues. These and other policies are available on the University website.

Academic Integrity (S2017-05)
Any instance of academic dishonesty or breach of the standards of academic integrity is serious and students will be held accountable for their actions, whether acting alone or in a group. See policy and procedures S2017-05 Academic Integrity for more information: https://www.capilanou.ca/about-capu/governance/policies/

Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances, are prohibited and will be handled in accordance with the Student Academic Integrity Procedures.

Academic dishonesty is any act that breaches one or more of the principles of academic integrity. Acts of academic dishonesty may include but are not limited to the following types:

Cheating: Using or providing unauthorized aids, assistance or materials while preparing or completing assessments, or when completing practical work (in clinical, practicum, or lab settings), including but not limited to the following:
- Copying or attempting to copy the work of another during an assessment;
- Communicating work to another student during an examination;
- Using unauthorized aids, notes, or electronic devices or means during an examination;
- Unauthorized possession of an assessment or answer key; and/or,
- Submitting of a substantially similar assessment by two or more students, except in the case where such submission is specifically authorized by the instructor.

Fraud: Creation or use of falsified documents.

Misuse or misrepresentation of sources: Presenting source material in such a way as to distort its original purpose or implication(s); misattributing words, ideas, etc. to someone other than the original source; misrepresenting or manipulating research findings or data; and/or suppressing aspects of findings or data in order to present conclusions in a light other than the research, taken as a whole, would support.

Plagiarism: Presenting or submitting, as one's own work, the research, words, ideas, artistic imagery, arguments, calculations, illustrations, or diagrams of another person or persons without explicit or accurate citation or credit.

Self-Plagiarism: Submitting one's own work for credit in more than one course without the permission of the instructors, or re-submitting work, in whole or in part, for which credit has already been granted without permission of the instructors.

Prohibited Conduct: The following are examples of other conduct specifically prohibited:
- Taking unauthorized possession of the work of another student (for example, intercepting and removing such work from a photocopier or printer, or collecting the graded work of another student from a stack of papers);
- Falsifying one's own and/or other students' attendance in a course;
- Impersonating or allowing the impersonation of an individual;
- Modifying a graded assessment then submitting it for re-grading; or,
- Assisting or attempting to assist another person to commit any breach of academic integrity.

Sexual Violence and Misconduct
All Members of the University Community have the right to work, teach and study in an environment that is free from all forms of sexual violence and misconduct. Policy B401 defines sexual assault as follows:

Sexual assault is any form of sexual contact that occurs without ongoing and freely given consent, including the threat of sexual contact without consent. Sexual assault can be committed by a stranger, someone known to the survivor or an intimate partner.

Safety and security at the University are a priority and any form of sexual violence and misconduct will not be tolerated or condoned. The University expects all Students and Members of the University Community to abide by all laws and University policies, including B.401 Sexual Violence and Misconduct Policy and B.401.1 Sexual Violence and Misconduct Procedure (found on Policy page https://www.capilanou.ca/about-capu/governance/policies/)

Emergencies: Students are expected to familiarise themselves with the emergency policies where appropriate and the emergency procedures posted on the wall of the classroom.

DEPARTMENT OR PROGRAM OPERATIONAL DETAILS

Mathematical Language
Use of proper Mathematical terminology and notation is an important component of Mathematics. Marks may be deducted for improper usage. For full details, please refer to your instructor.

Mathematics Learning Centre (MLC)
Instructional help and reference texts are available to students in the Learning Commons located in the Library in LB126.