Course Outline Form: MATH 3240 -Fall 2021

General Information

Course Title: **MATH 3240** – **Operations Research F (3-0) [0.50]**

Course Description:
This is a course in mathematical modelling which has applications to engineering, economics, business and logistics. Topics covered include linear programming and the simplex method, network models and the shortest path, maximum flow and minimal spanning tree problems as well as a selection of the following: non-linear programming, constrained optimization, deterministic and probabilistic dynamic programming, game theory and simulation.

Offering(s): Offered in odd-numbered years.

Prerequisite(s): (1 of MATH*1160, MATH*2150, MATH*2160), 0.50 credits in statistics

Co-requisite(s): MATH*2200

Credit Weight: 0.5

Academic Department (or campus): Mathematics & Statistics

Campus: Guelph

Semester Offering: Fall 2021

Class Schedule and Location:

LEC: Mon, Wed, Fri

10:30PM - 11:20PM Virtual – Teams online

Instructor Information

Instructor Name: Monica Gabriela Cojocaru
Instructor Email: mcojocar@uoguelph.ca
Office location and office hours: Online – Teams – TBD 1st week of classes

GTA Information: Tom Kielstra: ikielstr@uoguelph.ca

Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

For information on current safety protocols, follow these links: https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.

Course Content

Specific Learning Outcomes:

Mastering formulation and solution techniques of classic linear optimization, simplex algorithm, classic network models and matrix games problems at end of the class.
Increase reading comprehension and modelling skills via completion of homework assignments and short course projects. Use of Matlab/Octave/R/python for completion of some homework assignment problems and project simulations.

Lecture Content:

The following topics will be taught in 3 modules of the course:

1. MODULE: Linear optimization problems (LP) and duality: solving via graphical method, simplex algorithm & dynamic programing for LP (lectures during W1 –W4) ;
2. MODULE: Network and transportation problems as LP; matrix (linear) games solved with linear optimization methods (lectures during W6 – W9);
3. MODULE: Quadratic/nonlinear Optimization Problems (NLP): dual problems, Lagrange and and KKT systems (lectures during W11-W12).

Labs & Seminars: N/A

Course Assignments and Tests:

For clarity, the below table refers to:

First lecture: Friday, September 8, 2021
Week 1 of classes = Week of Sept. 13, 2021
Week 5 of classes = short: Wed-Fr, Oct. 13-15, 2021
Week 12 of classes = Week of Nov. 29, 2021
Reminder: Oct 11 and Oct 12 – NO CLASSES. Classes in these days are scheduled in Week 12.

Assigned work	Date	Location	Contribution to final mark
Homework: 1,2,3,4	H1: Week 4, Wed, Oct 6 H2: Week 7, Wed, Oct. 27 H3: Week 9, Wed, Nov 10 H4: Week 12, Wed, Dec. 1	Using Quiz format online – some hand written answers due on Dropbox folder on Courselink. Each homework opens from 10am – 5pm on due dates.	**2.5% x 4 = 10%**
Test 1	**Wed: Oct 20, 2021**	**Online in class time, duration 50 min**	**10%**
Test 2	**Fri: Nov. 19, 2021**	**Online in class time, duration 50 min**	**10%**
Project presentations & discussions	**Week 5, Wed & Fri Week 6, Mon Oct. 18**	3 teams each day (total of 9 teams); each team of students will only present ONCE in the course (in Weeks 5-6 or Week 10)	Each student in a team receives 30% (10% slides, 10% write-up, 10% individual Q&A)*
Project presentations & discussions	**Week 10, Mon & Wed, Nov. 15 & 17, 2021**	3 teams each day (total of 6 teams); each team of students will only present ONCE in the course (in Weeks 5-6 or Week 10)	Each student in a team 30% (10% slides, 10% write-up, 10% individual Q&A)*

FINAL EXAM: see Webadvisor for latest information. Final will use Lockdown Browser and live invigilation via your cell camera on Teams.

Homework, tests & project total = 60% Final exam weighting: 40%

Course Resources

Required Texts: N/A

Recommended Texts:
Hamdy Taha: Operations Research 8th or 9th edition.

Instructor's slides will be provided via the Courselink site of the course.

Students can also use older editions of the above text. Our course material can be found in many other introductory OR textbooks.

Course Policies

Email communication with Instructor:

- Student emails will be replied to on a first-come basis. The Instructor will not answer emails during the weekend, unless in extreme/urgent circumstances.
- Homework help is available during weekly Office Hours posted
- All communication with the entire class will take place either by email to class, or by posting relevant brief messages, which will be visible to everyone under "Announcements" on Courselink.

Homework assignments:

- Will be posted online on the Courselink page of the course. They will be using the Quizz feature of Courselink.
- They are also taking advantage of the Dropbox on Courselink. Each homework in Table above has a corresponding Dropbox folder where students can upload their hand-written solutions in pdf or jpg format.

*Project presentations and discussions (each student will collect 30% of the mark during this part of the course evaluation):

All students in the course will be divided (randomly) in a total of 15 teams. Each team will pick a topic to present in one of the weeks in Table above that relates to the course content up to that point. Numerical implementation of examples/models are welcome as part of the projects. Each project will have 3 components, yielding a total of 30% of the final grade.

Part1: slides presentations (10% - all members of the team get the same grade in this part)
Each team's presentation will last a total of 5 min and have a total of 10 slides, including title page and outline. It will be marked according to the following criteria and will be uploaded to the corresponding Courselink Dropbox folder the day of the presentation:

1) Talk Organization – properly timing the duration, slides quantity, outline and ease of reading, quality of figures – 5%;
2) Clarity – presentation flow and logic, ease of understanding and following the mathematical content, effectiveness in communicating the main ideas of the talk – 5%;

Part2: project write-up (10% - all members of the team get the same grade in this part)
Each team's written projects will be no more than 2 pages (excluding bibliography) and will cover the reading the student team has done on the presentation topic. The write-up will be a maximum of 2 pages long, single spaced, 12 point, and it will answer the standard questions outlined below:

1) Where is the model used and what are the model assumptions
2) What solution(s) method(s) is (are) employed by the authors
3) What are the main results and their importance
4) How does the research relate to the course material

The write-ups will be uploaded to the corresponding Courselink Dropbox folder the day of the presentation. The marking criteria for the written projects are:

1) Organization and clarity of mathematical and linguistic content – 5%

2) Understanding of the read material as reflected in answering questions 1,2,3 above – 5%

Part3: project Q&A (10% - each member of the team will get their individual grade in this part)
Each team will have a Q&A session after the presentation of at least 10-15 min. Each team member will have to answer in the Q&A on questions related to their project and course material. This is valued at 10%.

Grading Policies

All marked Tests (1 & 2) will be returned to students within 7 calendar days online. Solution and marking scheme for all assignments and tests will be uploaded on Courselink after the hand-in date.

University Policies

Recording of Materials
Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

E-mail Communication
As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement
When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic Consideration.

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

Drop Date
Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://calendar.uoguelph.ca/undergraduate-calendar/schedule-dates/

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml
Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

Copies of out-of-class assignments
Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility
The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

Academic Misconduct
The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

Resources
The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

Mental Health Services:

One out of every five students in Canada experiences some sort of mental health issue at some point in their academic career. If you find yourself facing a mental health crisis, or just need to talk to someone, please consider taking advantage of one of the following resources available to University of Guelph students:

Counselling Services: Visit the Counselling Services website (https://wellness.uoguelph.ca/counselling) to get information on resources available to you, both online and in-person. You can also visit them at Health Services (J.T. Powell Building, ext 53244) where they offer individual and group counselling sessions by appointment or walk-in.

Student Support Network: is located in the Wellness & Education Promotion Centre in the J.T. Powell Building and offers confidential, peer-based, drop-in support.

Good2Talk: (1-866-925-5454) is a free, 24/7 student hotline that provides professional counselling and referrals for mental health, addictions and well-being.

Here 24/7: (1-844-437-3247) specializes in assessment, referral and appointment booking and is available 24/7 for crisis support.

You are not alone and you will not be judged for asking for help.