

**SPRING 2021**  
**EMIS 8374 - NETWORK FLOWS**

**COURSE DESCRIPTION:**

Network flow problems appear as integral components of large-scale and realistic network design models for tactical and strategic decision-making in a wide range of industrial applications involving movement of raw materials, work-in-process, finished products, parcels/packages, information or passengers over geographical areas. Furthermore, various decision problems that are not on networks, such as production/inventory planning, manufacturing and workforce scheduling problems and project management, can be formulated as network flow problems.

We will review several such applications with a focus on their mathematical modelling and solutions on networks. We will cover well-known network flow problems including the shortest path problem, the maximum flow problem, the minimum cost flow problem, and the multi-commodity flow problem. We will also discuss modelling applications in the context of large scale problems related to network design.

Our goals are to provide a sound and applicable knowledge of theory and practice of solving network flow problems with an emphasis on developing a good understanding of algorithm development and analysis.

**Prerequisite:** *EMIS 8360 or equivalent background.*

**Instructor:** Halit Uster                      E-mail: [uster@smu.edu](mailto:uster@smu.edu)  
Caruth Hall 309                      Phone: (214) 768 3575

**TEXTBOOK:**

R.K. Ahuja, T.L. Magnanti and J.B. Orlin, Network Flows: Theory, Algorithms, and Applications, 1993, Prentice-Hall, Englewood Cliffs, NJ.

**TENTATIVE OUTLINE:**

1. Introduction, Definitions, Applications
2. Shortest Path Problem
3. Maximum Flow Problem
4. Minimum Cost Flow Problem
5. Minimum Spanning Trees
6. Multi-commodity Flows
7. Network Design Applications

**REFERENCES:**

1. D. Solow, How to Read and Do Proofs: An Introduction to Mathematical Thought Processes, John Wiley & Sons, 2004.
2. D. P. Bertsekas, Network Optimization: Continuous and Discrete Models, 1998, Athena Scientific, Belmont, Mass.

**OFFICE HOURS:**

**Virtual Office Hours:** For this semester, office hours can be anytime but by appointment. This means **we just need to setup a time to meet and I will send you a zoom invite at that time.** I strongly encourage each one of you to ask any questions you might have on the material during the lecture (even if you are connected online). It is very much to your benefit to get these points cleared as soon as they occur. You are strongly encouraged to make an appointment to visit with me whenever you have problems.

**GRADING AND TENTATIVE DATES:**

- 25% Exam 1 - February 25, Thursday (Online for all)
- 25% Exam 2 – April 8, Thursday (Online for all)
- 30% Final Exam – May 8, 2019, Saturday, 11:30am (Online for all)
- 20% Course Project

|                       |            |            |            |
|-----------------------|------------|------------|------------|
| <b>Grading Scheme</b> | [93-100] A | [90-93) A- | [87-90) B+ |
|                       | [78- 87) B | [75-78) B- | [72-75) C+ |
|                       | [62- 72) C | [59-62) C- | [48- 59) D |

If you must miss an exam, then I must be notified in advance. If your absence is not approved, then you receive a zero grade for the missed exam.

**ONLINE COURSE MANAGEMENT:**

Course materials will be posted on Canvas. These materials will include handouts, study sets, announcements (also via e-mail), grades, and other materials as appropriate. Please check it regularly. Your test grades will be posted on Canvas as well.

**OTHER IMPORTANT INFORMATION**

**Disability Accommodations:** Students needing academic accommodations for a disability must first register with Disability Accommodations & Success Strategies (DASS). Students can call 214-768-1470 or visit <http://www.smu.edu/Provost/SASP/DASS> to begin the process. **Once approved and registered, students will submit a DASS Accommodation Letter to faculty through the electronic portal *DASS Link* and then communicate directly with each instructor to make appropriate arrangements. Please note that accommodations are not retroactive and require advance notice to implement.**

**Religious Observance:** Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence (<https://www.smu.edu/StudentAffairs/Chaplain/ReligiousHolidays> ).

**Excused Absences for University Extracurricular Activities:** Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (See [2020-2021 SMU Undergraduate Catalog](#) under “Enrollment and Academic Records/Excused Absences.”)

**Student Academic Success Programs:** Students needing assistance with writing assignments for SMU courses may schedule an appointment with the Writing Center through Canvas. Students wishing support with subject-specific tutoring or success strategies should contact SASP, Loyd All Sports Center, Suite 202; 214-768-3648; <https://www.smu.edu/sasp>.

**Pregnant and Parenting Students:** Accommodations for pregnant and parenting students: Under Title IX students who are pregnant or parenting may request academic adjustments by contacting Elsie Johnson ([elsiej@smu.edu](mailto:elsiej@smu.edu)) in the Office of the Dean of Students, or by calling 214-768-4564. Students seeking assistance must schedule an appointment with their professors as early as possible, present a letter from

the Office of the Dean of Students, and make appropriate arrangements. Please note that academic adjustments are not retroactive and, when feasible, require advance notice to implement.

**Campus Carry Law:** In accordance with Texas Senate Bill 11, also known as the “campus carry” law, following consultation with entire University community SMU determined to remain a weapons-free campus. Specifically, SMU prohibits possession of weapons (either openly or in a concealed manner) on campus. For more information, please see:

[http://www.smu.edu/BusinessFinance/Police/Weapons\\_Policy](http://www.smu.edu/BusinessFinance/Police/Weapons_Policy).”

**Academic Misconduct:** Academic misconduct of any kind is prohibited by the SMU Student Honor Code. <https://www.smu.edu/StudentAffairs/StudentLife/StudentHandbook/HonorCode>  
Please print and fill out the attached pledge form as it applies to the fall 2020 semester via email to me ([uster@smu.edu](mailto:uster@smu.edu)) by 12:00pm on August 26, Wednesday.

**Covid-19 Attendance Statement:** Students who are experiencing COVID-19 symptoms or who have been notified through contact tracing of potential exposure and need to self-quarantine or isolate must follow the protocols laid out in [SMU’s Contact Tracing Protocol \(https://www.smu.edu/Coronavirus/Contact-Tracing\)](https://www.smu.edu/Coronavirus/Contact-Tracing). To ensure academic continuity, students in these situations will not be penalized and will be provided appropriate modifications to assignments, deadlines, and testing. Please also note that SMUFlex classes might, in rare circumstances, go remote for two-week periods to accommodate COVID-related issues. To ensure these necessary accommodations, affected students must:

Provide as much advance notification as possible to the instructor about a change in circumstances. Students must notify their instructor about a potential absence as well as plans for a return to class. For cases in which students test positive for COVID-19, they should fill out a [CCC form at this link \(https://cm.maxient.com/reportingform.php?SouthernMethodistUniv&layout\\_id=1\)](https://cm.maxient.com/reportingform.php?SouthernMethodistUniv&layout_id=1).

Communicate promptly with the instructor to establish, as necessary, alternative assignments and/or changes to deadlines and exams. Students are then responsible for meeting the expectations laid out in these alternative arrangements.

Continue participation in class via Zoom, as health circumstances permit. Attend class regularly, when not in a situation outlined above, in accordance with safety measures laid out by SMU CAN in the [Pledge to Protect](#) (including wearing masks, maintaining social distancing, and cleaning personal space after class). In-person participation in SMUFlex classes is required on students’ assigned red/blue rotation days except in cases when students are experiencing illness, are in self-quarantine or in isolation.

Students facing multiple or extended COVID-19-related absences or illness can work with the Office of the Dean of Students to consider options such as fully remote learning or medical withdrawal.

EMIS 8374 – Network Flows

Instructor: Dr. Halit Uster

PLEDGE FORM for SPRING 2021

**YOUR NAME:**

**STUDENT NUMBER:**

Please **DUPLICATE** in your handwriting and then sign and date the following pledge and the statement in the box provided.

**“As a student of the Southern Methodist University (SMU), under SMU Honor Code and on my Honor, I affirm that I will not give or receive any unauthorized help and/or share information in any form on any exam and assignment including lab assignments, cases, and projects during the semester, and that all work will be my own.”**

**“I have read and signed the [Pledge to Protect](#).”**



Once completed, please take its picture and email to me directly at [uster@smu.edu](mailto:uster@smu.edu)

Keep the original for your records.