MATH 5365, Spring 2018 — Graph Theory

MW 4:00 – 5:15, EduE 50 (3 credits, prereq 3355 with a grade of C- or better)

Instructor: Dr. Dalibor Froncek
Office: SCC 170
Phone: 7958
e-mail: dfroncek(a)d.umn.edu where (a)≅@
Web Page: http://www.d.umn.edu/~dfroncek/

Office Hours: M 1–2, Tu 1–2, W 2–3, Th 2–3, and by appointment

Textbook: *First Look at Graph Theory* by John Clark and Derek Allan Holton, **ISBN:** 9810204906

Course description:
This course should really be called *An Advanced Introduction to Structural Proofs via Graph Theory.* Rather than learning many facts and memorizing definitions and theorems, we will learn how to prove simple (and not-so-simple) theorems that deal more with objects and their structure than with what you have seen so far in other math classes, unless you already took some discrete math proof based course.

This is **not** a course where you would learn many algorithms or applications. It is intended to enhance your general mathematical thinking and reasoning, to learn how to work in groups on simple research projects, and how to present them effectively in writing.

Course goals and objectives:
Master and understand basic concepts, methods, and techniques of graph theory. Main topics: Trees and Connectivity, Euler Tours and Hamiltonian Cycles, Matchings, Planar Graphs, Colorings, Directed Graphs, Ramsey Theory, Graph Labelings and Decompositions.

Attendance requirements and penalties:
While regular attendance is highly recommended and very welcome, it is not mandatory and absences will not be penalized. Obviously, we will often in assignments, tests, and proofs performed in class refer to previously mentioned material which may not always be easily found in the book. Therefore, missing classes may cause difficulties in meeting the course standards. Because I will attend a few conferences and other events this semester, we will have to make up some classes. Therefore, there may be extra classes. Another option (my favorite) is to have one or two half-day research sessions on Saturdays! We will discuss these options in class and select what will best fit your schedules.

Assignments:
There will be assignments from almost every class. Problems will be posted on the web every week by Friday and are due on Wednesday except possibly for the weeks when there is a test. There will be NO make-up assignments. A 10–50% penalty may be assessed for repeatedly late assignments (you have one grace late submission). The lowest assignment score will be dropped. An assignment is assumed to be **your own work**! Therefore, you can collaborate with other people when preparing for the assignment, but you have to work alone when you are actually doing it. Also, you cannot use any kind of solutions to assigned problems that can be found in manuals, on Internet, or elsewhere.

Additional homework:
There will be homework exercises posted on the web but they are not to be turned in.

Tests:
There will be three tests. Tentative dates are weeks 5, 10, 14. The material to be covered in the tests will be announced in class. The tests can be open book and/or take home or a (group) project. Typically, Test 1 is a 2 hour in-class test, Test 2 is a "Perfect Proof", and Test 3 is a take-home or another 2 hour in-class test. In-class tests may be given at evening time periods (other than the usual class time) to give you extra time for completing the test without too much stress.

Missing an exam is a serious matter. In order to schedule a make-up exam, you must have a written medical excuse. Let me know of your absence before the exam takes place.

Final exam:
The Final Exam can be either a cumulative one or a project. It can either be in class or take home. This will be determined by April 15. Most likely, it will be a group research project. It will be due on the date of the scheduled final exam on Monday, April 30 at 4 PM.

Extra credit:
Extra credit is given in the form of bonus points. Details in class.

Grading:
Your grade in this course will be based on:
Tests = 60% (20% each)
Assignments = 20%
Final Exam = 20%
Bonus points (details in class)

Graduate and undergraduate students will be evaluated equally. There will be no difference in assignments, tests, final exam, or the grading scale.

Grading scale:
The grades are based on UMD Grading Policy: http://www.d.umn.edu/vcaa/GradingandTranscripts.html
Your grade in this course will be determined as follows:

91–100 A (Achievement that is outstanding relative to the level necessary to meet course requirements)
86–90 A–

81–85 B+
76–80 B (Achievement that is significantly above the level necessary to meet course requirements)
71–75 B–

66–70 C+
61–65 C (Achievement that meets the course requirements in every respect)
56–60 C–

50–55 D
below 50 F

Students with disabilities:
It is the policy and practice of the University of Minnesota Duluth to create inclusive learning environments for all students, including students with disabilities. If there are aspects of this course that result in barriers to your inclusion or your ability to meet course requirements – such as time limited exams, inaccessible web content, or the use of non-captioned videos – please notify the instructor as soon as possible. You are also encouraged to contact the Office of Disability Resources to discuss and arrange reasonable accommodations. Please call 218-726-6130 or visit the DR website at www.d.umn.edu/access for more information.

Cell phones, laptops, tablets etc:
Cellular telephones and other communication devices are prohibited during quizzes and exams. Having any communicating device out during an exam will be considered cheating and result in an immediate zero. Also note it is discourteous and a distraction to use phones and other devices during class time. If you do so you may be asked to leave the room.

Pictures and videos:
Photographs and video cannot be taken without prior instructor's consent. If a verbal consent is given, they cannot be made public (e.g., on internet) without written consent of instructor and UMD administration.

Policies:
The following policies apply:
http://www.policy.umn.edu/Policies/Education/Education/SYLLABUSREQUIREMENTS_APPA.html
http://www.duluth.umn.edu/vcaa/SyllabusStatements.html
http://www.d.umn.edu/vcaa/GradingandTranscripts.html
All students at the UMD must be in compliance with the student conduct code in the policies and procedures section of the 2012–2013 University Catalog, specifically in this course with regards to scholastic dishonesty. Academic integrity is of utmost importance and all procedures and sanctions will be followed as per the university catalog.

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities and employment without regard to race, religion, color, sex, national origin, handicap, age, veteran status or sexual orientation.

Student learning outcomes as they relate to the course objectives

- Demonstrate mastery of fundamental mathematical concepts and techniques
- Apply mathematical techniques appropriately
- Recognize the power of mathematics to model real life situations
- Demonstrate competence and confidence in the workforce
- Maintain a desire for learning
- Communicate mathematics to non-technical audiences as well as to peers

If you don't understand what I mean by this, you are not alone. I don't understand it either, but I am mandated to include it here by the Syllabus Policy http://www.duluth.umn.edu/vcaa/Syllabus.html

Academic Dishonesty—Prohibited Conduct:

All forms of academic dishonesty are prohibited, including (but not limited to):

1. submission of false records of academic achievement
2. cheating on assignments or examinations
3. submitting sentences or ideas as your own without proper acknowledgment or citation (plagiarizing)
4. altering, forging, or misusing a University academic record or forging the signature of any member of the University community
5. taking, acquiring, using, or circulating test materials without faculty permission
6. acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement
7. facilitating academic dishonesty by helping another student to violate the academic integrity policy, such as providing course work for another student to turn in as his or her own effort or taking an exam for another student
8. presenting as one's own a plot, succession of ideas, or list/outline of another without proper acknowledgment
9. attending a class, completing an assignment, or taking a quiz/test in the name of another student
10. copying, editing, using, or deleting computer files without permission
11. altering or viewing computer records, dispensing or releasing information gained via unauthorized access, modifying computer programs or systems, or interfering with the use or availability of computer systems or information
12. bribing or attempting to bribe, promising favors, or making threats with the intention of affecting a grade, a record, or an evaluation of academic performance
13. purchasing or otherwise presenting work as your own when it was done by another person
14. submitting the same paper or generally similar papers to meet the requirements of more than one course without the approval and consent of all faculty members of all such courses
15. depriving another student of necessary study or research materials or in any way impeding another student's work and pursuit of education
16. submitting falsified data, such as bibliographic resources and experimental data or altering graded academic work/quizzes/tests and resubmitting them in order to get a higher grade (fabrication)
17. intentional use, misuse, or alterations of University materials or resources in an attempt to make them inaccessible to others (e.g., altering passwords, unauthorized use of computer accounts, violation of library procedures, intentional misuse or destruction of educational materials)