

MTH 481: Discrete Mathematics I
 Class: M/W/F 1:50 - 2:40, A122 Wells Hall
 Credit hours: 3

Instructor: Elizabeth Munch, Ph.D.
 Asst Prof, Dept of CMSE, Dept of Math
E-mail: muncheli@egr.msu.edu
Phone: 517-432-0619

Office: 428 South Shaw Lane
 Engineering Bldg, Rm 1511
Office Hours: 11am - 12 noon, Tue/Fri
 or by appointment

Course Description: Binomial and multinomial theorems. Graphs and digraphs, graph coloring. Generating functions, asymptotic analysis, trees. Representing graphs in computers.

Prerequisites: MTH 309

Websites:

- The D2L website, <https://d2l.msu.edu/>, has course-related files (syllabus, homeworks, daily worksheets) and up-to-date grades.
- Piazza will be used for class discussion, <https://piazza.com/msu/fall2018/mth481/home>. Rather than emailing me for answers to questions that would likely be of use for the whole class, I encourage you to post your questions there. In particular, it supports L^AT_EX, just type two dollar signs around what you want to write, i.e. $f(x)=3x$ to get $f(x) = 3x$. Piazza is also the most successful when you can work together to answer each other's questions, so I also encourage you to answer other students' questions as well. You can post questions and answers anonymously if you prefer, however please be aware that posts are not anonymous to the instructor. I reserve the right to delete and follow up on inappropriate and non-constructive comments.

Textbook: *Combinatorics and Graph Theory, second edition*, by Harris, Hirst, and Mossinghoff. An electronic copy is available through the MSU library at <http://doi.org/10.1007/978-0-387-79711-3>.

Grading:

- **Homework:** There will be daily homework assigned which will **not** be turned in for a grade. I cannot stress how important homework is for your success in this class. That being said, I will not be grading it. You are expected to have completed the previous day's homework problems before the subsequent class, and all problems before the final exam.
- **Quizzes:** There will be a quiz once a week given at the beginning of class. You will have 10-15 minutes, depending on the quiz, to complete it. The quiz will have 2-5 problems similar to the previously assigned homework problems. So if you already completed and understood the homework, the quiz should be quite easy. The date of the quiz will not be announced, and no makeups will be given. At the end of the semester, I will drop your two lowest quiz grades (assuming this improves your grade).
- **Exam:** There will be one midterm exam given in class, and a final given during finals week (Tuesday, Dec 11 2018 3:00pm - 5:00pm in A122 Wells Hall).
- **Points:** Your grade will be based on the total number of accumulated points from the semester. The *estimated* number of points, and the conversion to the 4.0 grading scale, is below.

	<i>Estimated Points</i>	<i>Percentage</i>	<i>Final grade</i>
		[90, ∞)	4.0
		[85, 90)	3.5
		[80, 85)	3.0
		[75, 80)	2.5
		[70, 75)	2.0
		[65, 70)	1.5
		[55, 65)	1.0
		(-∞, 55)	0.0
	TOTAL:		
	400		

Calculators: In class and on tests, you may use a calculator. During tests and quizzes, this may **NOT** be your cell phone. A four function calculator will be enough to do everything we need, please do not buy a TI-83 or anything like that if you do not already have one.

Test Makeup Policy: If you know you will be absent on the day of an exam, send me an email ASAP. If you have emailed me BEFORE the start of the exam letting me know that you will not make it, and provide written documentation to me before 24 hours after the exam that you could not attend the class for reasons in accordance with the university attendance policies, (<https://ombud.msu.edu/classroom-policies/index.html>), your grade for the missed exam will be the average of your other exams.

Classroom Behavior: The university, college and department has a commitment to respect the dignity of all and to value differences among members of our academic community. Attacks of a personal nature or statements denigrating another on the basis of race, sex, religion, sexual orientation, age, national/regional origin or other such irrelevant factors will not be tolerated. Students who are not respectful, not civil, or disruptive in any way may be asked to leave the class.

Academic Honesty: All assignments, exams, quizzes, projects, and exercises completed by students for this class should be the product of the personal efforts of the individual(s) whose name(s) appear on the corresponding assignment. Cheating or plagiarism is a serious offense and will not be tolerated. Any potential cheating case will be thoroughly investigated, and could potentially lead to failure in the course or even to expulsion from the university; visit the Ombuds website for academic integrity for more information <https://www.msu.edu/unit/ombud/academic-integrity/>.

Accommodations Due to Disability: If you have a documented disability that requires academic accommodations, please contact me as soon as possible. In order to receive accommodations in this course, you must provide me with documentation of a disability from RCPD. More information about this can be found at <https://www.rcpd.msu.edu/services>.

Tentative Schedule:

Note that this schedule is only provided as a guide and is very likely subject to change. Please check D2L and Piazza regularly for reading assignments and true schedule.

Date	Sections	Description	Date	Sections	Description
Wed, Aug 29		What is discrete math	Mon, Oct 22	1.2.1	Graph distance
Fri, Aug 31	2.1	Three basic problems	Wed, Oct 24	1.2.2	Graphs and matrices
Mon, Sep 3		No class (Labor Day)	Fri, Oct 26	1.3.1	Trees
Wed, Sep 5	2.2		Mon, Oct 29	1.3.2	Properties
Fri, Sep 7	2.2	Binomial coefficients	Wed, Oct 31	1.3.3	Spanning trees
Mon, Sep 10	2.4	Pigeonhole principle	Fri, Nov 2	1.3.4	Counting trees
Wed, Sep 12	2.5		Mon, Nov 5		overflow
Fri, Sep 14	2.5	Pinciple of Inclusion-Exclusion	Wed, Nov 7	1.4.1/2	Eulerian trails and circuits
Mon, Sep 17	2.6	Generating functions	Fri, Nov 9	1.4.3	Hamiltonian paths and cycles
Wed, Sep 19	2.6.1	Double decks	Mon, Nov 12	1.5.1	Planarity
Fri, Sep 21	2.6.2 - 2.6.3	Multi-sets/changing money	Wed, Nov 14	1.5.2	Euler's formula
Mon, Sep 24	2.6.4	Fibonacci numbers	Fri, Nov 16	1.5.3	Regular polyhedra
Wed, Sep 26	2.6.5	Recurrence relations	Mon, Nov 19	1.5.4	Kuratowski's theorem
Fri, Sep 28	2.6.6	Catalan Numbers	Wed, Nov 21		overflow
Mon, Oct 1	2.6.6	Catalan Numbers (cont)	Fri, Nov 23		No class (Thanksgiving)
Wed, Oct 3	2.7.1	Groups	Mon, Nov 26	1.6.1,1.6.2	Colorings, chromatic number
Fri, Oct 5	2.7.2	Burnside lemma	Wed, Nov 28	1.6.3	The four color theorem
Mon, Oct 8		overflow	Fri, Nov 30	1.6.4	Chromatic polynomial
Wed, Oct 10		Review	Mon, Dec 3	1.7.1	Matchings
Fri, Oct 12		Midterm	Wed, Dec 5		Special topics/ Review
Mon, Oct 15	1.1.1	Graphs	Fri, Dec 7		REVIEW
Wed, Oct 17	1.1.2	Basics, connectedness	Tues, Dec 11, 3 - 5pm, A122 Wells Hall		FINAL
Fri, Oct 19	1.1.3	Special graphs			