Discrete Mathematics

Instructor:	Dr. Sarah Hanusch	***Office:***	**468 Shineman**
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	Email is the preferred method of contact.	***Office Hours:***	T 2:00-4:00pm
			W 3:00-4:00pm
			F 9:30-10:30am
			or by appointment

GENERAL OUTLINE

Math 215 focuses on logic, and the foundations of mathematical proof. This is done via the ideas of relations and functions, set theory, elementary concepts of number theory such as divisibility and modular arithmetic, counting techniques, probability and graph theory. The underlying curriculum consists of two themes: logic and precision of expression, and mathematical thinking through problem solving and proof. Clear and careful writing is expected.

LEARNING OBJECTIVES

Upon completion of this class, the successful student will be able to:
- Evaluate reasoning
- Write rigorous mathematical proofs
- Apply appropriate proof frameworks
- Adapt proofs and arguments for different purposes
- State and apply definitions
- Assess the truth value of statements
- Construct examples and counterexamples
- Translate between mathematical notation and English
- Present mathematical content and arguments orally and in writing
- Critique written and oral presentations given by peers
- Interpret feedback on written and oral presentations to make improvements

The above learning goals will be achieved while studying the following mathematical content
- Boolean Algebra and Logic
- Set Theory
- Relations
- Functions
- Prime factorization and Divisibility
- Modular Arithmetic
- Euclidean Algorithm
- Graph Theory
- Combinatorics
- Probability

REQUIRED MATERIALS	There are two required texts for this course.

A Spiral Workbook for Discrete Mathematics by Harry Kwong.
ISBN: 978-1-942341-16-1
Available at http://textbooks.opensuny.org/a-spiral-workbook-for-discrete-mathematics/

Notes on Discrete Mathematics by Miguel Lerma
Available at
http://www.math.northwestern.edu/~mlerma/papers/discrete_mathematics-2005.pdf |
| ***COMMUNICA-TION*** | I will communicate with you using Blackboard and email. You need to check your oswego.edu email address regularly. Furthermore, if you contact me about the course, it should be from your oswego.edu email address. If you contact me from a personal email address, I may not legally be allowed to answer. |
| ***LEARNING EXPERIENCES*** | This course will include the following opportunities for you to learn new mathematics:
- Readings: The in-class activities and lectures will supplement the textbook and other readings. To successfully learn the material in this course, you need to read your textbook and complete the "Hand-on Exercises".
- Discussions: We will have small-group and whole-class discussions throughout the course to explore new ideas and synthesize knowledge from various sources. These discussions give you the chance to think about how to communicate mathematical ideas to others in an informal setting.
- Presentations: You will present your findings from in-class activities, problem sets and assessments. These presentations will give you the opportunity to communicate mathematical ideas to others in a formal setting. I expect you to complete at least 7 presentations throughout the semester, so approximately one every other week.
- Homework: Homework will be assigned each Monday and has two components Board Work and Turn-In. Board Work is due Wednesdays, and will be presented by you either on the blackboard or using the projector. You get credit for any presentation, even if it is incorrect. These presentations give you individualized feedback, and provides the largest benefit on the difficult questions. Solutions to Turn-In problems are due on Fridays. Each solution should be on its own page and typed.
- Projects: During the course, you will complete two projects to improve your understanding of the course ideas. The first project concerns the role of proof in the mathematics community. The final project is a summative portfolio that will contain returned work from throughout the semester.
- Quizzes: Quizzes may be given on the weeks that we do not have exams. However, these quizzes are meant to help you assess your progress and do not count towards your grade.
- Exams: We will have four midterm exams and a comprehensive final exam. You should view each of these exams as an opportunity to show what you currently know, but also as an arrow that points you to areas you need to continue to work on. |

GRADING

Attendance/   Regular attendance is critical to success in this course. There are no "excused"
Punctuality: absences except for a <u>documented</u> extended illness (more than a week and should
be submitted through the Dean of Students) or <u>documented</u> school absences (e.g.,
sports, student government). Students with more than 4 absences will have one
point deducted from their course average for **each** absence over 4.

You are responsible for all material covered or assigned during a missed class.
You should make student contacts from class as a means of getting missed notes,
assignments, etc.

You are expected to be in class and ready to begin at the scheduled start time.
Excessive, repeated tardiness will be treated as additional absence(s).

Homework: Homework will be assigned weekly.

Board Work is due on Wednesdays. When you arrive to class, you will sign-up
for a problem to present and either write your solution on the blackboards around
the room, or will have a nice version to display on the digital projector. Once
another student has claimed a problem, you can only present your solution if the
solution paths are significantly different. You will receive credit for every
presentation you give whether or not the solution is correct. The expectation is
that learning from the Board Work, will improve your accuracy with the Turn-In
problems.

Although you will not present every Board Work problem, the expectation is that
you will complete them all.

Turn-In homework is due on Fridays. Most weeks there will be 2-3 questions, but
occasionally this number may change. Each Turn-In solution needs to be typed
and submitted on a separate page. I expect you to attach your scratch work to
your typed solution, so I can see your progress.

I will read and comment extensively on these problems. I expect you to read
these comments and learn from them. However, turn-in homework is primarily
graded for completion.

I STRONGLY encourage you to type your homework solutions in *LaTeX*, a
mathematical typesetting program. However, I will accept any typesetting
program.

Assignments are designed to deepen your grasp of concepts from class. Your goal
should be to <u>master</u> the material, not just "get it done." Due to the benefits of
cooperative effort, you are welcome to work on homework with others. Be sure
you know how to ***<u>do</u>*** the work, not just *watch* someone else do it. However, you
must each type your assignments separately. You do not want to submit
assignments with identical phrasing.

Copying another's work is not permitted, and is a violation of the SUNY
Oswego's Intellectual Integrity policy.

Presentations: Throughout the semester you will have many times to present solutions to problems. Most of these occasions will be from board work, however, we may also present solutions to turn-in problems, quizzes and exams. I expect you to present at least 7 times during the semester. However, your only source of extra credit this semester is to complete extra presentations. I reserve the right to refuse extra presentations in order to give all students ample opportunities to earn these points.

Projects: Two projects will be assigned this semester.

The first project concerns the role of proof in the mathematics community. For this project you will read a paper by Michael de Villiers titled *The role and function of proof in mathematics*, which I will provide to you. You will reflect on this paper, and write proofs emphasizing the various role of proof. More details will be provided in class. This project is due Friday April 7.

The final project is a summative portfolio that will contain returned work from throughout the semester. It is important that you keep your returned homework and exams. For this project you will show your growth throughout the semester and the breadth techniques we discussed. This project is due Friday April 28.

Midterms and Final Exam: You will take four full-period midterm exams during the semester. These exams will be cumulative. Missing an exam is <u>strongly discouraged</u>. Make-up exams will not be given without compelling documented evidence for the absence. Exam dates will be announced in class. ***Tentative*** exam dates are February 13, March 6, April 3, and April 24.

Your highest midterm exam grade will count as 15% of your final grade. Your lowest midterm exam grade will count as 5% of your final grade. The remaining two exams will each count as 10% of your final grade.

A two-hour cumulative final exam will be held in Shineman 150 on

> MAT 215-810: Wednesday, May 10 from 10:30 AM to 12:30 PM.

> MAT 215-820: Monday, May 8 from 2 PM to 4 PM.

The final exam will count as 15% of your final grade.

Grading Structure:

Homework	18%
Presentation (7 presentations)	7%
Role of Proof Project	8%
Portfolio	12%
Midterm Exams	40%
Cumulative Final Exam	15%
TOTAL	100%

To earn a(n):	A	A-	B+	B	B-	C+
You must earn:	93%	90%	87%	83%	80%	76%
	C	C-	D+	D	D-	E
	70%	68%	65%	60%	55%	<55%

POLICIES

Common Courtesy: Cell phones should be **off & put away** during class. If you text during class, you may be asked to leave and will be marked absent. If you arrive late, please enter with the least disruption possible. Please do not sleep during class. If you tend to get tired, bring a beverage or snack, but be sure to clean up your trash.

Open & Honest Communication: One way I will communicate with you is by written comments on graded work. Please read those comments and act upon them. If you have problems or concerns regarding the course, call or see me **as soon as possible**. I want you to succeed in this course and will work with you toward that end.

Additional Help: If you need help, *please come see me*. I am available during office hours or by appointment. Scheduled office hours are your time with me, so please interrupt me. When you arrive knock on the door, so I know you are there.

Free tutoring (by appointment or walk-in) is available from the Office of Learning Services at www.oswego.edu/academics/support/OLS. Study groups can also be very helpful.

Accommodation: If you have a disabling condition which may interfere with your ability to successfully complete this course, please contact Disability Support Services in 155C Marano Campus Center.

Academic Integrity: SUNY Oswego is committed to intellectual integrity. Any form of intellectual dishonesty is a serious concern and therefore prohibited. The full policy can be found at http://www.oswego.edu/integrity.

Important Dates:

Wednesday, 2/1:	Last day to add a semester course without penalty.
Friday, 2/10:	Last day to drop a semester course without penalty.
3/13-3/19:	No Class – Spring Break
Friday, 3/31:	Last day to get paperwork signed for withdrawals
Wednesday, 4/5:	No Class – Quest
Friday, 4/14:	No Class – Good Friday
Friday, 5/5:	Last day of class
Monday, 5/8:	Final Exam, 8-10 am