Mathematical Foundations of Computing

Spring 2023 **Math 130**

Welcome to Math 130! You can call me Prof./Dr. Chowdhury. I am the instructor for this course, and I am glad to have you here!

§A. What is this class?

We will study an area of Mathematics that computer science is built on, called Discrete mathematics, and learn how to demonstrate proper understanding of discrete mathematics concepts and methods using proof techniques. Discrete math is the study of counting, patterns, and structures involving discrete (separate, not continuous) objects – like people, meals, clothing, and board games. We can use it to model and understand a wide range of real-world problems, from social networks to March Madness.

This class will be hard work. Part of doing real math is productive failure: You'll try things that don't work; learn something from that failure; and try something new that works a bit better. And… after a while, you will figure it out, and come out with a much stronger understanding of the structure of mathematics.

§B. Key Information

Course Info

- **Class Meetings:** MWF 9:00 AM - 9:50 AM (EST), Taylor 206 (until Feb 27.)

How to find me

- **Instructor:** Subhadip Chowdhury
- **Email:** schowdhury@wooster.edu
- **Phone:** 330-263-2473
- **Office:** Taylor 307

Zone Intern

- **Name:** Patrick May
- **Email:** pmay24@wooster.edu

Office Hour

- MS Bookings link

Required Study Materials

- **Textbook:** We will mainly use PowerPoint lecture slides created specifically for this class - these will be available on Moodle. You can use Applied Discrete Stuctures by Al Doerr and Ken Levasseur as a reference. The text is open-source and freely available online.

Class announcements

- **Available on:** `https://moodle-2223.wooster.edu/`
  Check Moodle and your Wooster email at least once before and after each class.

Additional details on some parts of the syllabus are available on Moodle.

Contents

§C. Catalog Description

This course introduces discrete mathematics. Topics include set theory, logic, truth tables, proof techniques, sequences and summations, induction and recursion, combinatorial counting techniques, discrete probability, graphs, and trees.

Prerequisites: one CSCI course with minimum grade C-.

§D. Course Objectives

Basically, this course teaches mathematics applied to situations that involve things that can be separated and counted. For example, counting the number of times a loop in a computer program executes involves separating things (the different iterations of the loop) and counting them. So, in Math 130, we look at the mathematical processes that computer science is built on, especially the structures that are the basis for the data structures you'll encounter later. After successful completion of this course, you will be able to ...

- Convert logical statements from informal language to propositional and predicate logic expressions
- Apply formal logic proof techniques (direct proof, proof by contradiction, and induction, counting arguments) in the construction of a sound argument.
- Perform the operations associated with sets, functions, and relations
- Compute permutations and combinations of a set and interpret the meaning in the context of the particular application.
- Calculate probabilities of events and expectations of random variables for elementary problems such as games of chance.
- Solve a variety of basic recurrence relations.
- Illustrate by example the basic terminology of graph theory, as well as some of the properties and special cases of each type of graph/tree.

In addition to everything above, we will focus on some important ideas that span discrete mathematics as well as all of mathematics. Specifically, I want you to...

- Succeed! Specifically, I want you to develop a deep understanding of the ideas outlined above. You can expect me to push you in many ways to help you achieve these. As a result, this class will not be easy, but that's good: You learn by struggling!
- Improve your ability to see patterns, make conjectures, and write proofs independently. These will happen through class activities, homework, and quizzes. This will happen with time, experience, and hard work.
- Learn how to persevere in problem-solving, reason abstractly, construct arguments and critique others' arguments, model with mathematics, and look for and make use of structure.

- Discover math from a new point of view. Discrete math is often surprising for students: It looks different from most other kinds of math. That's great! Mathematics is truly about structure, pattern, and proof – things that will be central to our study of discrete mathematics.

§E. How do I earn a grade

Our course is graded by a methodology called the Learning-Based Grading system, also called standards-based or mastery-based grading, in which most graded work do not have a point value or percentage. Instead, you earn your grade by showing **appropriate engagement** with the course (including active participation and appropriate civil conduct in the classroom, as described in section E.1 below) and **demonstrating evidence of skill on the learning objectives** that describe the major ideas covered by each assignment. These objectives are listed in section K and will be updated throughout the semester.

When you submit most work, I will evaluate it relative to the quality standards made clear on each assignment. If your work meets the standard, then you will receive full credit for it. Otherwise, you will get helpful feedback and, on most items, the chance to reflect on the feedback, revise your work, and then reassess your understanding.

This feedback loop represents and supports the way that people learn. Learning happens over time, as we revisit ideas and reflect on them. In this class, your final grade will reflect how well you eventually understand each topic. You can make mistakes without penalty, as long as you eventually demonstrate fluency in the topic.

E.1. Types of Assignments

Active Participation and Engagement (daily)

For aspiring young scholars and professionals, consistent effort is a necessary starting point. Full engagement will be expected in your future college courses and in a professional setting, so they are also expected here. The active participation of every student in all activities (whether whole class, small group, or individual) leads to the best learning environment for everyone. Some ways in which engagement can be demonstrated include the following:

- participating in collaborative group work
- giving constructive feedback during in-class discussions
- asking relevant questions in class, during office hours, or through email
- creating an inclusive & welcoming class environment for peers
- Completing the weekly homework on time.

See also section F.1 for attendance and absence policies.

Weekly Homework. These are traditional practice problems and proofs using the ideas we've learned in class. *They will be at a higher level of difficulty than quizzes.* In addition to any other

instructions given with the assignment, I expect you to follow the guidelines below to get the best scores on your homework:

- **Explain fully and present a convincing argument.** This is required for every problem, even if not explicitly stated. Use appropriate proof techniques, take care with quantifiers and logical reasoning, and communicate plans clearly to the reader.
- **Follow the Math 130 Writing Guidelines** (available in Moodle). This includes correct spelling, grammar, and punctuation amongst a whole bunch of other best practices.
- **Turn in solutions for the questions in order** (for example, do not turn in work for question 2 after work for question 1). The easiest way to do this is to start each problem on a new page and not put more than one answer on a single page.
- Certain homework problems may involve writing pseudo-code that produces the desired output from the given input. Format your answer for these with proper spacing and syntax.
- **Make your answer legible.** Your answer script should not look like scratch work. Responses that consist of only answers with no work shown, or where the work is insufficient or difficult to read, or which have significant gaps or omissions (including parts left blank) will be given a grade of 0.

Note: Homeworks are due at 5 PM every Tuesday.

Quizzes (see the schedule)

Rather than midterm or final exams, we will have in-class quizzes almost every Friday before Spring Break, and alternate Fridays after Spring Break. The tentative dates are listed in Moodle.

Each quiz will cover all of the standards that we have discussed up to that point in the class. For example, the first quiz should cover about 3 standards. The second quiz will cover about 5 standards, and so on. In this way, the last two quizzes in the last weeks of the course will have all course standards present.

See section E.2 for an explanation of how course standards are scored in quizzes. Having each quiz contain questions pertaining to every standard we have covered thus far means each new quiz is another opportunity to show your proficiency in the course standards. If you initially struggle with a particular standard, you will have the time and opportunity to study, practice, and try again.

Note that there will be no make-up quizzes. If you miss a quiz, you will have the opportunity to complete a course standard again on subsequent quizzes. See section F.2 for certain exceptions to this rule.

E.2. How are Course Standards scored in quizzes?

Each standard represents about 1–2 days of classwork. They are listed in section K approximately in the chronological order we will cover them. For each standard, you'll earn one of the following scores:

- **M** (Meets Expectation) - Understanding of the concepts is evident through correct work and clear, audience-appropriate explanations. There may be some need for revision or expansion, but no significant gaps or errors are present.
- **P** (Partial Understanding) - Demonstrates useful progress, but with a major gap. Gaps include: major math errors, incomplete work, or unclear communication or reasoning that leaves understanding in doubt. **Additional review is necessary. Reassess in the next quiz.**
- **X** (Not Assessable) - Fragmentary or no response. An insubstantial attempt, too many errors to correct each individually, or uses an inappropriate method or tool for this problem. **Must be redone from the beginning.**

Note: You may sometimes get a **P*** on a standard in a Quiz. This grade indicates work that contains an error which I think is minor, but I need to talk with you about it. Come to my office to discuss a **P*** within two days after it is returned. If you can convince me that the error was minor and explain how to fix it, then I will update the **P*** to an **M** for free. If I don't hear from you within two days, a **P*** automatically becomes a **P**.

You will receive helpful feedback on unsatisfactory work, the chance to reflect on the feedback, revise your work, and then reassess your understanding in the next quiz. My hope is that this method of grading will keep you clearly informed as to the expectations of the class and how well you are meeting them, while also removing the (often distracting) elements of linear grading that uses letters or total points. If you have questions or concerns at any time, please feel free to discuss them with me.

Description of Scores on Moodle

- When you earn a **M** grade on a standard the first time during a quiz, it will be marked as **In-Progress** in Moodle.
- If you earn a second grade of **M** on that same standard during a quiz, it will be marked as **Complete** in Moodle.

I recommend you keep track of which standards you have completed and to what degree separately, in your own records (using your returned quizzes), and then compare against what I have recorded on Moodle. This will help ensure no user error on my part because if you see a discrepancy between your records and Moodles, please let me know and I will fix it.

Note: One important thing to keep in mind during this class is that you should not be discouraged if you don't earn **M** on a standard the first time. That's normal. I'm only interested in what you can show me you can do by the end of the semester. However, do not put off finishing the standards; it will be hard to catch up if you fall too far behind.

How is the final letter grade determined?

To determine your course base grade (the letter **A/B/C/D/F** without plus/minus modifications), use the following table. *To earn a grade, you must complete all the requirements in the column for that*

grade; your base grade is the highest grade level for which all the requirements have been met or exceeded. There are no grades of **A+**, **D+**, or **D-** at Wooster. If you do not meet all of the criteria for a **D**, your grade will be an **F**.

Category	A	B	C	C-	D
Participation & Engagement	Frequent	Regular	Occasional	Occasional	Minimal
Homework Score	70%	60%	50%	45%	40%
Course Standards (16)	**In Progress** on at least 15; **Complete** on at least 12	**In Progress** on at least 13; **Complete** on at least 10	**In Progress** on at least 11; **Complete** on at least 8	**In Progress** on at least 10; **Complete** on at least 6	**In Progress** on at least 9

I will set +/- grades based on how close you are to the next higher (or lower) letter grade. For example, a student who has frequently participated in class, gets 90% homework score, gets **In-Progress** on 16 standards, but **Complete** on only 12, would earn a grade of A-. Please contact me any time during the semester if you want to review your current progress.

Note: A grade of C- or higher is necessary to receive credit toward any major or minor.

§F. Policies

F.1. Attendance and Absence

Attendance is *crucial* to success in this class. Your best chance to discuss new material, ask questions, and avoid confusion is during class. So, don't miss class! You are responsible for all material and announcements from class, even in case of absence. Much of this information will be available on Moodle. Please check in with me and with your classmates when you are back.

That said, life happens. We get the flu (or COVID!). Relatives need your help. When this happens, do what you need to do. I trust that you are an adult and will make the best choices that you can. I appreciate it if you can notify me in advance of an absence, if possible.

It is College of Wooster policy that a student may not miss more than 25% of class meetings (e.g. about 6-7 classes for a full-credit course in spring semesters), through any combination of excused and unexcused absences. If you think you will miss more than one class in a row, you should contact me beforehand to let me know, and meet me afterward to discuss how you can catch up and move forward in the course. If you miss three classes in a row, I will send out an academic alert. If you miss more than 7 classes, you should contact Dean Jen Bowen and/or Amber Larson, Director of the Academic Resource Center. They can help you consider options for dropping the course.

F.2. Early and Late Work

Early Work

Homework: If you know about an absence in advance (including any religious holiday), you may arrange an early drop-off time for homework, send work with a friend, or leave it with our ZI.

Quizzes: You can arrange to take a quiz up to one day early if you have a conflicting extracurricular college event on that day, and you got permission from the Dean's office or your coach. *In such cases, you must give me a heads-up by Monday of the week leading up to the quiz.* Contact me directly regarding other cases.

Late Work and Tokens

In general, my course policy is to not accept any late work. Each student starts the semester with **3 tokens**, which can be used to purchase exceptions to this rule. The token menu is below. *To purchase an exception, send me an email.* The cost of each item is listed at the beginning:

- (Costs 2 tokens) Delay a checkpoint quiz until Monday or Tuesday next week. This will need to be in person at my office - email me to discuss availability. This does not apply to the final quiz.
- (Costs 1 token) Reassess a Learning Target outside of quizzes during specific weeks. *Standards 1-10 are available after Spring break, the rest of the standards are available during the last 2 weeks.*

Warning: For a course standard to be marked as ''Complete'', one of the 'M' must come from a quiz.

Throughout the semester, there will be opportunities for earning more tokens through class engagement or satisfactory performance in homework. Please note that any leftover token at the end of the course will be counted towards class engagement, but has no value towards your scores. If you have significant extenuating circumstances that cause you to miss multiple assignments/quizzes (even with tokens), see me to discuss arrangements.

F.3. Special Accommodations

The Academic Resource Center, which is in APEX (Gault library) offers a variety of academic support services such as time management and class preparation, ELL peer tutoring, coordinating accommodations for students with diagnosed disabilities, etc. Please see the **Academic Policies, Procedures & Support Services** document for further details or go to the ARC website.

F.4. Email Responses

I do my best to reply to emails promptly and helpfully. However, I receive a lot of emails. To help both you and me, here are some specific expectations about emails:

- If you email me between 8:00 am and 5:00 pm on a weekday, I'll reply to you on the same day.

- If you email me in the evening or overnight (after 5:00 pm), I will reply to you the next weekday.
- If your email asks a question that is answered in the Syllabus or on Moodle (such as in an announcement or an assignment sheet), I may reply by directing you to read the appropriate document.

Note: See Moodle for further instructions and examples of good professional emails.

§G. How to get help?

G.1. My Office Hours

Please come see me during my office hours (book a meeting first) if you have questions or just want to discuss something from class. These will be most effective if you have spent some time formulating your questions beforehand - often you will answer your own questions during that process! You can also contact me via Email or MS Teams with your questions. See the email response section above for my 'business hours'!

G.2. Zone Intern Office Hours

Patrick May (class of '24) is your ZI for this course. Patrick will be present during all of our class meetings. He will assist us with in-class discussions, problem sessions, and other assignments much in the same way as me: by answering questions and providing guidance. The main role of a zone intern is to be a peer tutor and mentor to help strengthen your understanding of the course material. Patrick will hold his own office hours within the Math Center.

See Moodle for office hour times and further instructions.

§H. Academic Integrity and Collaboration

In this class, your primary goal in this course is to develop a deep personal understanding and expertise in the theory behind Discrete Math concepts. Collaboration and cooperation are extremely helpful in the learning process, and we will have many opportunities for collaborative work. However, there are some portions of our class that must be done independently.

The College's understanding and expectations regarding issues of academic honesty are fully articulated in the Code of Academic Integrity as published in The Scot's Key and form an essential part of the implicit contract between the student and the College. The Code provides a framework at Wooster to help students develop and exhibit honesty in their academic work. You are expected to know and abide by these rules.

In this class, we will use the following definition of plagiarism:

Definition 8.1

Plagiarism is the act of submitting the work of someone else as if it were your own. Specifically, this action misleads the instructor to think that the work is the result of learning and understanding by the student named on the paper, when in fact the understanding truly belongs to someone else. This may apply to an entire solution, or individual parts of a solution.

H.1. Specific academic honesty expectations

It is often unclear what exactly ‘‘collaboration" means when working on assignments. The following section should clarify what my expectations are regarding this and give guidelines for avoiding plagiarism in assignments. The list is intended to be helpful but not exhaustive. If you are unsure about the appropriateness of some form of assistance on an assignment, you should always ask me.

- **Weekly Homework:** You are allowed to work collaboratively on homework problems but make sure you understand the steps yourself and that you submit your own work. Utilize the Math center to practice homework problems and other similar problems with your ZI and to enhance your study strategies, but please understand that your ZI is not going to do the homework for you.

  Any collaboration should occur only when your collaborator is at essentially the same stage of the problem solution as you. In particular, if you have not yet started problem #4 and you ask a friend (who has already completed it), "How did you do problem 4?", this counts as **plagiarism.**

- **Outside resources in general:** On all work, unless directly stated otherwise, the only resources you may use are our class notes (including any worksheet on Moodle) and the approved textbook (see the first page). While you are not permitted to go looking for completed solutions to problems in other texts or resources, you are allowed to look up examples and instructional videos online to enhance your learning. Often, full solutions for our homework problems can be found online. If you see such a solution prior to submitting homework, there is essentially no way that you can claim to have an original solution.

- **Math Center Tutors:** You are encouraged to seek their help on homework, and after you have taken a quiz to clarify and understand a concept. Please seek their help only after putting forth significant personal effort.

If there is any evidence of dishonest behavior, the guidelines established in The Scot’s Key will be followed. I reserve the right to discuss the nature and origins of any assignment with any student prior to assigning a grade.

H.2. A positive note

Remember that I want you to be successful. That is, I want you to develop a deep, personal understanding of the material we study so that you become a better student of mathematics who can go on to do well in all of your future endeavors. Every part of this course structure - including

both collaborative work and restrictions on collaboration - are intended to help you with this. You will often struggle, and that's intentional - struggle (and eventual success!) is essential to learning. Indeed, productively failing (and learning from it) is part of your final grade.

In all aspects of the course, please understand that I am generous with hints and am always willing to discuss problems with you. I will never simply give you an answer, but I will offer direction and guidance that will assist you in coming up with a solution on your own. This is by far the most satisfying way to solve a problem, and the difficulty is well worth it. You are always welcome to discuss your questions or concerns with me at any time.

§I. Academic Policies, Procedures & Support Services

I.1. Conflicts with Academic Responsibilities

The College of Wooster is an academic institution and its fundamental purpose is to stimulate its students to reach the highest standard of intellectual achievement. As an academic institution with this purpose, the College expects students to give the highest priority to their academic responsibilities. When conflicts arise between academic commitments and complementary programs (including athletic, cultural, educational, and volunteer activities), students, faculty, staff, and administrators all share the responsibility of minimizing and resolving them.

As a student, you have the responsibility to inform the faculty member of potential conflicts as soon as you are aware of them, and to discuss and work with the faculty member to identify alternative ways to fulfill your academic commitments without sacrificing the academic integrity and rigor of the course.

I.2. College Policy on Final Examinations

No final examinations are to be given during the last week of classes or on reading days. Students who wish to reschedule a final exam must submit a petition to the Dean for Curriculum and Academic Engagement in advance of the examination. The student must confer with the instructor before submitting a petition, and the instructor should indicate to the Dean if they support the petition. Normally, such petitions are granted only for health reasons. If other reasons necessitate a request for a change in a final exam, the request must be submitted three weeks in advance of the examination. You can find electronic petition forms on the Registrar's website.

I.3. Course Withdrawal Options (for 2022-23 Academic Year)

Students may withdraw from a course after the 6th-week drop deadline until the last day of classes (Tuesday, May 9, 2023, in Spring 2023). Students may withdraw from one course, up to 1.25 credits, at any time through the last day of that class, as long as their total remaining credits are 3.0 or above. This may be done without documentation of extenuating circumstances. Requests to drop enrollment below 3.0 credits will require additional documentation through a Petition for an Exception to an Academic Policy.

Note that because the federal government guidelines define courses as 'attempted' after 6 weeks (or 3 weeks for a half-semester class), if a student withdraws from a course after that point, it will be noted as a 'W' on their transcript.

I.4. Academic Resource Center: Academic Support and Disabilities

Contact: Amber Larson, alarson@wooster.edu, (330)263-2595, ARC Website

The Academic Resource Center, which is in APEX (Gault library) offers a variety of academic support services, programs and 1:1 meetings available to all students. Popular areas of support include time management techniques, class preparation tips and test taking strategies. In addition, the Academic Resource Center coordinates peer-tutoring for several academic departments. Students are encouraged to schedule an appointment.

An additional support that the Academic Resource Center offers is English Language Learning. Students can receive instruction or support with English grammar, sentence structure, writing, reading comprehension, reading speed, vocabulary, listening comprehension, speaking fluency, pronunciation, and American culture through 1:1 meetings with the Academic Resource Center staff, ELL Peer Tutoring, ELL Writing Studio courses, and other programming offered throughout the year.

The Academic Resource Center also coordinates accommodations for students with diagnosed disabilities. At the beginning of the semester, students should contact the Academic Resource Center to make arrangements for securing appropriate accommodations. Although the Academic Resource Center will notify professors of students with documented disabilities and the approved accommodations, students are encouraged to speak with professors during the first week of each semester. If a student does not request accommodations or does not provide documentation to the Academic Resource Center, faculty are under no obligation to provide accommodations.

Your success in this course is important to me. If there are circumstances that may affect your academic performance or impact your learning in particular portions of the class, please let me know as soon as possible. You do not need to share specifics, but together we can develop strategies to meet both your needs and the requirements of the course. There are also a range of resources on campus, including the Writing Center, Math Center, STEM Success Initiative, and APEX.

I.5. The College Libraries and the Research Help Desk

Contact: library@wooster.edu, 330-263-2493, Libraries website

Your librarian for this course is Ian McCullough. You can ask your librarian for help with research in this class and can make an appointment with them using the research consultation form for help with your research and information needs, including finding and using items we have in the Libraries; learning expert tips to refine your search for articles in magazines, journals, and newspapers; making an appointment with a librarian for help on a project; and learning how to evaluate the information you discover.

I.6. Basic Needs, Food Security & Access to Course Materials

Contact: Dean of Students Office, dos@wooster.edu, 330-263-2545, Galpin Hall

We learn as whole people. To learn effectively you must have basic security: a roof over your head, a safe place to sleep, enough food to eat. If you have trouble with any of those things or need assistance obtaining the course materials for this or other classes, please talk with me or with staff in the Dean of Students office. Together we can work to make sure those needs are met. There is a Technology Assistance Application (Wooster login required) and Wooster alums have created a fund to assist students who encounter a personal financial crisis during their time at the College; find out more about this Emergency Funding through the DoS office.

I.7. Diversity and Inclusion

The College of Wooster is committed to inclusive excellence in undergraduate education, and our department seeks to actively foster a welcoming learning environment in which diversity and individual differences are valued, respected, and celebrated. Diversity comes in many forms, including but not limited to, race, color, national origin, ancestry, sex, gender identity and expression, sexual orientation, socioeconomic status, religion, age, and physical and/or mental abilities. The diversity that students and staff bring to the classroom is an invaluable resource, strength, and benefit to everyone at the College of Wooster. As such, we remain vigilant and attentive about issues of diversity, equity, and inclusion in the classroom. Expressions or actions disparaging others are contrary to the mission of the department and will not be tolerated.

It is also important that we all be respectful of everyone's privacy around health concerns, vaccination status, and any accommodations that are necessary for the classroom. It is not appropriate to question why someone requests physical distancing, chooses to wear a mask or requires any other accommodations. As part of our participation together in this class, we commit to showing respect to each other as individuals, to working together to create a learning environment that fosters a sense of belonging and inclusion to all members, and to understanding that our differences are also strengths. Your suggestions are encouraged and appreciated, and please contact me—via email, office hours, or after class—if you have any concerns or questions.

No student is required to take an examination or fulfill other scheduled course requirements on recognized religious holidays. Please declare your intention to observe these holidays at the beginning of the semester.

I.8. Names, Pronouns & Pronunciation

All people have the right to be addressed and referred to as they prefer. I will do my best to address and refer to all students by the names and pronouns that they share in class, regardless of what is listed on the roster, and I support classmates in doing so as well. I would like for you to refer to me as **Prof. Chowdhury** or **Dr. Chowdhury**. I use he/him/his pronouns. Please share the name you prefer to be called and pronouns you wish to use in this class with me via classroom introductions or privately.

If you are interested in changing your chosen name and/or including your pronoun(s) in The College of Wooster system, you can find additional information here. What appears in The College of Wooster system is what will display in all platforms across Microsoft Teams. At present, there is no alternative way to change your name or to add pronouns in Teams, but you can add a background that includes these for any video platform.

I encourage everyone in this classroom to create a space of mutual respect and support by also giving each other some grace around pronouns, pronunciation of names, etc., if or when we make mistakes. This is not at all to absolve anyone of responsibility for using correct pronouns, names, and pronunciations. But I find it useful to acknowledge that even with the best of intentions, sometimes we can all still make mistakes.

I.9. Title IX Reporting Policy

Contact: Joe Hall, jhall@wooster.edu, Title IX website

The College of Wooster is committed to fostering a campus community based on respect and nonviolence. To this end, we recognize that all Wooster community members are responsible for ensuring that our community is free from discrimination, gender bias, sexual harassment, and sexual assault. In accordance with Title IX, Wooster is legally obligated to provide supportive options for all reports of sexual harassment and sexual assault that occur on our campus. Faculty who become aware of an incident of sexual violence, including harassment, rape, sexual assault, relationship violence, or stalking, are mandated reporters at the College and are required to notify Wooster's Title IX Coordinator. The purpose of this disclosure is to ensure that students are made aware of their reporting options and resources for support. For more information about your rights and reporting options at Wooster, including confidential and anonymous reporting options, please visit https://inside.wooster.edu/title-ix/.

I.10. Discriminatory or Bias-Related Harassment Reporting Policy

Contact: Visit the Bias Reporting website

The College of Wooster is committed to promoting its mission of inclusivity and equity in all aspects of the educational enterprise. This commitment extends to all rights, privileges, programs and activities, including housing, employment, admissions, financial assistance, and educational and athletic programs at the College. The College's Bias Incident Reporting Process is designed to effectively respond to bias concerns raised by faculty, students, staff, alumni and visitors to the College. If you or someone you know are the victims of bias, you can:

- File a report online (where you may choose to identify yourself or not)
- Contact Security and Protective Services: 2590 (from campus phone) or 330-263-2590
- Call the Anonymous Tip Line: 2337 (from campus phone) or 330-263-2337
- Contact the Dean of Students Office: 2545 (from a campus phone) or 330-263-2545

- Contact the Vice President for Equity, Inclusion, and Diversity Cheryl Nuñez at 330-263-2356

I.II. Well-being at Wooster

Contact (24/7): (330) 263-2319, or visit the Wellness Center website

The College of Wooster is committed to supporting the wellbeing of our students. During the course of their academic careers, students experience challenges that may interfere with their learning & health (both physical and mental), including but not limited to: strained relationships, adjusting to a new environment, chronic worrying, persistent sadness or loss of interest in enjoyable activities, family conflict, grief and loss, domestic violence, unwanted sexual experiences, difficulty concentrating, drug/alcohol problems, significant changes in eating and sleeping patterns, microaggressions, challenges with organization, procrastination and/or lack of motivation. Counseling Services at the Longbrake Student Wellness Center is a free and confidential resource providing short-term counseling and connections to community agencies for students needing longer term or specialized resources. You can make an appointment by calling 330.263.2319 between 8:30am-4:30pm during weekdays or by emailing Lori Stine (lstine@wooster.edu). You can also find helpful resources on the Counseling Services website at https://inside.wooster.edu/health/counseling/.

Students also have free access to TimelyCare, a telehealth service providing scheduled medical and counseling appointments as well as 24/7 crisis consultation with licensed professionals. Students use their Wooster email to establish an account at TimelyCare: Telehealth for Scots. TimelyCare also provides students access to nutritionists and health coaches about issues of sleep and exercise, and psychiatry (with a referral from doctor or counselor).

If you or a friend is in crisis, please call Campus Safety at 330-287-3333 or the National Suicide Prevention Lifeline (1-800-273-TALK) or connect with the Crisis Text Line by Texting ''4HOPE'' to 741-741.

For financial concerns: Dean of Students Office, dos@wooster.edu (330) 263-2545, DoS website

For safety concerns: Campus Security and Protective Services (330)263-2590 or cow-security@wooster.edu, Campus Safety website. **In the care of an emergency, call: 330-287-3333.**

§J. Disclaimer

I reserve the right to make changes to this syllabus if needed. Any changes will be announced to the class in a timely manner.

§K. Math 130 Course Standards

The following course standards will be assessed through quizzes (and practiced through homework) during the semester. Your goal is to earn an "**M**" on each objective twice to get the best grade. Usually, problems on quizzes would be more direct and computational than homework assignments. See section E.1 for expectations regarding homework.

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1. **FL1 (Statements and Connectives)** - Translate compound statements involving logical connectives; and write the negation, converse, and contrapositive of implications.
2. **FL2 (Truth Tables and Logical Equivalences)** - Use truth tables and formulas (e.g. De Morgan's law) to prove the logical equivalence of two wffs using propositional logic.
3. **FL3 (Quantifiers and Predicates)** - Learn the proper usage of quantifiers, translate an English sentence into a predicate wff, and state its negation.

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4. **PT1 (Proof Techniques)** - Outline the proof structure of a given statement using a proof technique. Identify logical errors in a proof.

   Additionally, *In homework* - Create a precise conjecture statement based on data. Write correct and complete proof by contradiction and proof by contrapositive.
5. **PT2 (Induction)** - Prove a statement using the principle of mathematical induction by clearly stating and proving the base case, stating the inductive hypothesis, and completing the induction step.

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6. **RR1 (Recursive Definition)** - Generate several instances of a sequence, set, operation, or algorithm defined using recursion.
7. **RR2 (Recurrence Relation)** - Convert a word problem to a recurrence relation and find a closed-form solution. Examples include linear first-order (homogeneous and non-homogeneous) and linear second-order homogeneous recurrence relations.

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8. **ST1 (Set notation and relation)** - Represent a set using roster notation and set-builder notation. Determine if an object is an element of a set, and determine set relationships (equality, subsets).
9. **ST2 (Set Operations)** - Perform operations on sets (intersection, union, complement, Cartesian product), determine the cardinality of a set, and write the power set of a finite set.

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10. **CP1 (Basic Counting Rules and PIE)** - Use the multiplication principle, the addition principle, and the Inclusion-Exclusion principles appropriately within a counting problem, including

choosing process/sets in an appropriate order, applying cases as necessary, and using complements.

11. **CP2 (Permutation and Combination)** - Use permutations and combinations appropriately within a counting problem. Use factorials and binomial symbols correctly. Avoid over- or under-counting.

12. **CP3 (Probability)** - Determine discrete probability for independent, mutually exclusive, and conditional events.

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13. **RF1 (Relations and Digraphs)** - Draw the digraph of a relation and determine whether it is symmetric, reflexive, or transitive.

14. **RF2 (Functions and their properties)** - Determine whether a given relation is a function; determine the domain, range, and codomain of a function; and determine whether it is an injection, surjection, or bijection.

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15. **MA1 (Matrix Operations)** - Solve equations involving matrix addition, multiplication, and the transpose of 2×2 or 3×3 matrices.

    Additionally, *In homework* - Determine inverse and determinant of matrices.

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16. **GT1 (Graphs and their representations)** - Use and work with basic terms such as 'graph', 'vertex', 'edge', 'degree', etc. correctly in the context of graph theory problems. Use graph notation correctly (such as writing the names of edges, using sets of vertices or edges, using degrees, etc.). Determine if two given graphs are isomorphic.