MATH 131: Discrete Mathematics - Dr. Miller - Syllabus - Fall 2024 (CRN 9069)

**Keep this syllabus with your course handouts. You are responsible for reading it entirely.
The syllabus is subject to change in extenuating circumstances.**

Meeting Times/Place: MWF 9:00-9:50, ECB 321

Content: (From the SRU Catalog; the Department-approved Student Outcomes are on the next page.)

This course begins the study of the language and concepts needed for higher-level mathematics. Students will learn principles of logic, focusing on logical forms, truth tables, and statement calculus. Students will analyze examples of and complete calculations involving sets, relations, and functions. Students will also receive an introduction to counting techniques and recursion. This course is not a proof-based course.

Prerequisites: Passed MATH 125 (Pre-Calc), 225 (Calc I), or 230 (Calc II); or sufficient ALEKS placement score

Follow-Ups: Math majors (and mid-level math education majors) need to earn a C or higher in this course.

Text: *Discrete Mathematics: An Introduction to Mathematical Reasoning* by Epp (any format you like)

We use the Brief Edition, NOT the "With Applications" edition. Online homework and extras are NOT needed, but some formats of the ebook link through an automated site (CENGAGE or WebAssign).

Classroom environment/Professional Etiquette:
- I write on the front board; sit near the front for a good view. Take thorough notes; ask questions often.
- I **CANNOT ALLOW MOST FOOD/DRINKS** in the classroom due to SRU-documented disability.
- See me if this restriction conflicts with your own documented accommodations.
- Don't distract yourself with cell phone use or off-topic chatter during class.

Personal Environment: I go by my middle name with friends and Dr. Miller in professional settings, so I am sensitive to what other people want to be called. Please let me know your preferences.

Contact Info and Student Help/Consult Hours:
- Email: lyn.miller@sru.edu - Phone: 724-738-2878 - Office: VSC 200-B
- Student Consult Hours: **MWF 10:30-11:30 am and F 2-4pm**. Just stop by!
- I can also make appointments outside of listed office hours.
- Our course assistant, Laura, will share her own tutoring hours and contact info when finalized.

Course Communication/Email Availability:
- See the News item in D2L explaining our web-vs-D2L presence and trouble-shooting the web page.
- My web page is **granite.sru.edu/~lmiller** . Daily posts are in the MATH 131 link there, not on D2L.
- If I must contact the group outside class time, I'll email.
- I check SRU email regularly 9-5pm Mon-Thurs, 9-4pm Fridays, excluding classes or appointments. Evenings/weekends, I don't use work email much and don't expect you to reply to anything I send.
- (I do sometimes send emails during off-hours just so they'll be in your InBox first thing in the morning.)
- I will gladly email with you individually outside of work hours by prior arrangement/appointment.

Grading: $A = 90 - 100\%; B = 80 - 89\%; C = 70 - 79\%; D = 60 - 69\%; F = 0 - 59\%$
- Daily HW Score (150 pts) + Exams #1-3 (100 pts each) + Final Exam (150 pts) = 600 points total
- I don't give attendance points nor extra credit opportunities.
- If you have an SRU-documented learning accommodation, please inform me during Week 1.

Homework (HW): Turned in daily, worth 10 points each and scaled to 150 course points at end.

- We'll have 30-35 daily HWs this term, for a RAW total of 300-350 HW points (NOT *course* points).
- I drop your lowest few scores (10-15%) at the end; the remaining total is scaled to 150 COURSE points.
- The exact number N (around 4-5) of scores to be dropped will be announced as we get near semester's end.
- HW is due at the start of each class, often after a brief Q&A time. Please staple and get rid of ragged edges.
- I grade a selection among the problems each day, for correctness and completeness.
- Answers without work/support often do not earn full credit. When asked, justifications must be precise.
- You may collaborate on HW or get tutoring help, but **do not COPY** from others, the web, books, AI, etc. **Inappropriate collaboration may result in a score of 0 for all involved, regardless of intent.**
- Seek help beforehand if you have trouble with material on HW. (See the Help list below.)
- Rarely, and only with permission, I may allow a brief, same-day extension, typically with a penalty.
- Solutions (usually partial) are later posted outside my office door and on D2L. To honor copyright/intellectual ownership, do NOT share solutions beyond our course.

Mid-Term Exams: Worth 300 course points total: 100 each for Exam #1, #2, #3, no collaboration

- **Budget your study time to avoid anxiety:** A math student will feel more ready for a 50-minute exam if they practice and study (not cram) for 5-10 hours over the week leading up.
- A Topics List is provided in advance (usually 1 week). Study thoroughly, based on that List.
- Answers without work/support often do not earn full credit. When asked, justifications must be precise.
- Justifications/work are graded on correct MATH knowledge, notation, reasoning, etc., not just effort.
- Honesty and integrity are expected; violations may result in a score of 0 for all involved.
- Tentative Exam #1, #2, and #3 dates are posted on the course web page. They take the whole period.
- Students with SRU-approved accommodations must discuss each exam process with me one week in advance.
- Exams are returned in 1-2 class days; solutions are posted outside my office door and on D2L after grading.

Final Exam: cumulative, worth 150 course points total, no collaboration, honesty/integrity expected

- You MUST take the Final at the scheduled time shown on the web page and SRU's official schedule: **FRIDAY, Dec. 13, 8-10 am**
- The Final is in our regular classroom. It has its own Topics List to help you prepare.
- Students with SRU-approved accommodations must discuss the process with me one week in advance.
- Final exams are not returned to you, and grades typically take 3-5 days to finalize.

Make-Up/Absence Policies:

- Excused absences will be determined on a case-by-case basis but usually consist of illness, accident, family illness/death, or University-sanctioned travel/activity. Prepare to give me official, written documentation if you will be claiming an excused absence.
- **Make-up policy for HW:**
  - WITH a documented excused absence and effort to let me know ASAP, I will decide whether you may submit the assignment late (usually not if I've already returned it to others and posted the answers) or simply double-count a chosen, upcoming assignment to replace the missed score.
  - WITHOUT a documented excused absence, there's no make-up, but remember that I do drop your lowest few scores. This allows you to miss a small number of HWs "just because." A missed HW score of 0 hopefully just becomes one of the N scores that are DROPPED at the end of the course.
  - Turning in HW early or via email when you'll be absent is usually approved, but ask first.
- **Make-up policy for exams:**
  - Make-up exams require a valid, **documented** reason and **meaningful** efforts to contact me in advance.
  - If approved, your percentage on the cumulative Final Exam substitutes for the missed exam score.
  - That is, I'll count PART of the Final as a score that replaces your missed Mid-Term Exam score.
  - This means you will NOT have to squeeze in a separate, extra "make-up exam" while facing a stressful return and catch-up in missed classes, and it means the other students in the course can get their graded exams and solutions promptly, without delaying for your schedule.

Attendance:

- A sign-in sheet circulates daily, but attendance does NOT count toward your grade.
- If you are absent, you're responsible to get the notes from a **classmate**. (I teach from an outline, not notes.)
- Assignments and announcements are available via my web page **granite.sru.edu/~lmiller**.

Help:

- You can get help from me during help/consult hours (above) or by appointment.
- Our course assistant Laura will also hold free tutoring hours just for our course.
- The Math/Stats Assistance Center (MAC) offers free walk-in tutoring Monday-Thursday evenings 5-10pm in VSC 103, but you have to share the tutors' attention across many courses.
- Times and locations for me, the course assistant, and MAC tutoring will be pinned in D2L for quick reference.
- SEEK HELP EARLY AND OFTEN!

Student Outcomes - Math 131: Discrete Mathematics
(SRU Department of Mathematics)

1. **Students will communicate using the logical and notational language of mathematics.**
2. **Students will analyze symbolic and verbal statements using the rules of logic.**
3. **Students solve counting problems.**
4. **Students will use recursion to solve appropriate problems.**
5. **Students will describe and solve problems involving functions and relations between sets.**
6. **Students will characterize features of graphs and solve graph application problems.**

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Important University-wide policy statements:

<u>Title IX</u>: Slippery Rock University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, Title IX requires University faculty members to report incidents of sexual discrimination, including sexual violence, shared by students to the Universitys Title IX Coordinator. Accordingly, if a student shares information about any incidents of sexual discrimination or sexual violence during a classroom discussion, in a writing assignment for a class, or in other contexts, faculty must report that information to the Title IX Coordinator. This information will only be shared with the Title IX Coordinator, who is the individual on campus designated to respond to reports of discrimination or sexual violence. While the Title IX Coordinator is not a confidential source of support, they will address matters reported to them with sensitivity and will keep your information as private as possible.
Additionally, faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred, to the person designated in the Universitys Protection of Minors Policy.
Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at: https://www.sru.edu/offices/human-resources-and-compliance/sexual-misconduct-and-title-ix-resources .
Slippery Rock Universitys Title IX Coordinator is Karla Fonner and she can be reached at karla.fonner@sru.edu; 724-738-2953, or you can submit a Care Referral with the details of the situation.

<u>Non-discrimination</u>: Slippery Rock University of Pennsylvania does not discriminate on the basis of race, color, sex, sexual orientation, gender identity, gender expression, national origin, religion, age, disability, or veteran status in its programs or activities in accordance with Title IX of the Educational Amendments of 1972, the Americans with Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973, Title VII of the Civil Rights Act of 1964, and other applicable statutes and University policies. https://www.sru.edu/offices/human-resources-and-compliance/notice-of-non-discrimination.

- **What This Course Is About, Why You Need It, and How It's Taught**

    Content: This course differs from the algebra-and-calculus type of mathematics you're familiar with in that discrete mathematics trains you to talk about and to apply very precise logic, and strengthens your capacity to reason abstractly. It stretches your ability to think carefully and deeply about mathematical ideas and concepts, rather than just perform step-by-step procedures. Proper use of language is also a big feature, one that often comes as a bit of a culture shock. While numbers and variables will appear in some of our work, about half of the course deals with topics that are NOT based on arithmetic. **I'll repeatedly describe this course as being about "precision of language, precision of notation, and precision of reasoning."**

    Rationale: You need deep, conceptual understanding of mathematics to truly succeed in later course work and in your chosen profession (in math, statistics, education, computer science, etc.). You also need to spot flaws in reasoning - including your own! - and have keen control over details both computationally and conceptually, in order to be trusted by those who will rely on your expertise. In a nutshell, a course like Discrete Mathematics serves as a bridge between the useful but often automated skills of working with numbers, formulas, and functions, and the ability to adapt and apply those skills to true problem-solving, kind of like the difference between someone who knows how to drive a car versus someone who also understands how/why it works and therefore has the ability to repair or improve it, too.

    Pedagogy: You'll see a lot of "I do, we do, you do" teaching when we encounter new material: I present foundations and initial set-ups, then we work through a few examples with extra observations in class, and finally you practice on your own - including deeper or more complex tasks - in HW. Sometimes, we'll use active, non-note-taking tasks in groups, but these are most often deep-thinking activities or explorations, not computations. I also have a strong philosophy of including tasks that require critical and flexible thinking, so prepare to work hard and pay attention to details. I call on individuals often to share ideas, give the next step in an example, offer an alternative approach, etc. (so long as you're comfortable with that).

    Sometimes in the course I'll ask you to explain things. **"Explain" *ALWAYS* means "use words."** More about my expectations can be found in the section on Criteria.

    Recent research shows that students who take notes by hand learn and retain information better than those who try to type on a laptop. (There's even exploration of whether using pre-planned, "fill-in" notes is better ot not.) I use the board a LOT(!) to MODEL how to organize your thoughts as you learn, but don't fall into the trap of thinking that only things I've written should be things you write. As I speak, or as your classmates speak, try to listen for the key idea or question, what are the highlights, what are the potential errors, and jot those things down in your notes too. This also gives you a chance to practice skills that will be very handy during parent-teacher or client-consultant conferences, when you have to listen to and converse with others while also trying to keep a useful record of what was discussed.

- **A Little More about Our Exams**

    What Mid-Term Exams Are Like and Tips on Preparing: We have three 100-point mid-term exams this semester. The tentative dates are posted on our course web page, but I keep them somewhat flexible, to adjust for obligations that may be happening in your other courses, professional or University events that affect multiple students, etc.

    Exams require you to solve new problems, including to explain or apply covered concepts. I don't often reuse problems. One week prior, you'll get a Topics List stating what's on each exam; however, the List does not summarize nor give practice problems. (Summaries are in your notes, and practice is what you've been doing in HW!) Past successful students say the best way to use the Topics List is to make your own study guide, where you copy down **precise** statements and fully-worked examples as well as cautions about the items listed. This requires you to review your notes, reading, and graded and ungraded HW problems to see what we have said/done about each item. Old exams on my web page are good examples of length or sources of a few practice problems, but they are NOT templates for this semester's exams - I seldom teach a course identically to the past! You need to let this semester's Topics Lists guide your study.

    Each exam takes the whole period; you can turn it in and leave if you finish early. You'll be permitted to have your pen/pencil and a calculator out during exams, but nothing else: no cell phones, beverages must be on the floor, etc. If I see evidence of dishonesty, all involved may get a 0.

    And remember to devote good study time to avoid test anxiety. When I was in marching band, we would rehearse 15 HOURS for a 15-MINUTE half-time show in order to feel confident and ready to perform well. Other activities in life are similar. So don't go into a 50-minute math exam having spent just 1-2 hours total

in studying for it. Lack of solid preparation is a sure ingredient for being scared and anxious in a situation; budget your time to be able to study definitions and practice problems for a couple of hours PER DAY over the week leading up to an exam.

Make-Up Policy for Exams: Substitution from the Final If you find that you'll miss an exam, I expect you to notify me as soon as possible, and provide a documented, University-approved reason for your absence. If approved, you will NOT have to schedule and take an alternative exam at that time, though: waiting until after an absent classmate can take a make-up exam delays the return of everyone elses feedback, and fitting an extra, stressful task into your own schedule if you've already been out is not easy for you either. So to make up your SCORE on that missed exam, at the end of the semester, I use your Final Exam percentage on the missed material (ONLY that missed material) to fill that gap. Since the Final's cumulative, it will definitely have questions on it that cover what the missed exam did. Be sure to prepare extra-well for those questions, since their score counts twice. You can use your study copy of the missed exam and its solutions to help.

How is the Final Exam Different? The Final Exam is cumulative, worth 150 course points total, and has its own Topics List. Honesty is expected, as above. The Final is administered in our regular classroom, but on the date and time specified in SRU's official Final Exam Calendar. **You MUST take the Final at the officially scheduled time for our course.** Do NOT plan travel or other activity that conflicts with it; make sure your family and employers understand this also.
Our Final is scheduled for Friday, Dec. 13, 8:00-10:00 am.

- **Criteria and Expectations (for graded items in the course):**

    HW and exam scores reflect how well you understand the course content, and that means concepts – ideas, relationships, vocabulary, abstract processes, etc. – not just algorithms that move numbers and symbols around. Therefore, on homework and exams, I expect that you will, among other things:

    Show correct, complete work: I often award partial credit for some correct work even with a wrong answer; conversely, if your work for a problem is wrong or incomplete, you will earn very few points even if you got a correct value or expression in the end. Also be sure you actually answered the question or drew a conclusion. For instance, if a problem asks you to find a total number of people, and you only tell me the separate numbers of adults versus children, you haven't completed the task.

    Justify your answers/work when asked: Justifications and verbal explanations are a significant component of your grade. Students are surprised by the very high quality I require in order to earn full credit on them (we are operating at a high level on Bloom's Taxonomy, something educators and education majors hear about a lot). Your informal justifications or explanations *will* be verbal/words, not just lists of computational steps. You must aim for the calibre of a future professional supporting the method or explaining the material, NOT of a child showing their scratchwork or describing their thinking. You should be showing or writing about the necessary MATH in a problem, not about yourself. Unhelpful statements such as "I just kept trying numbers until it worked" or disorganized steps whose order makes sense only to you are unlikely to be worth many points as a justification or explanation.

    Apply critical thinking: Fully comprehend instructions: what I ask for IS what you'll get points on, no more, no less. I see two kinds of mistakes here: first, sometimes students don't think about or don't understand the ordinary English vocabulary. For instance, if the instructions ask you to "explain," the meaning of that term requires using words, so if you merely list equations or computations with no verbal discussion to connect them, you will earn 0 points because you didn't give an actual explanation. Second, I assess for you're-going-into-this-profession-someday skills, not child-like skills. So for example if a question says to demonstrate one technique but you show another, again you will get few points because the point of the question is not just to get a final answer somehow (which may have been okay when you were a child), but to demonstrate the ability to adapt your approach and have a large and varied toolbox of skills (necessary from a professional).

    Behave with integrity: In your professional life, the people you deal with will expect you to be honest with them, maintain standards, and not cut corners. Establishing those traits early and solidly is important, so I will expect such behavior of you in this class. Being honest and not cutting corners means doing your own work on assignments, not just copying from a friend or worse, cutting-and-pasting from the web/AI - that's plagiarism! It means not trying to give yourself an unfair or impermissible advantage on exams or quizzes through things like crib sheets, web helps, etc. Being honest obviously includes not giving a false or unfairly exaggerated reason to try to get a make-up or extension on a task. Maintaining standards means not doing someone else's work for them yet letting them turn it in as their own. SRU's policy on academic integrity is at rockpride.sru.edu/policies/#search=integrity . The University expects that students will demonstrate their mastery of subject matter (in our case, skills, outcomes, and knowledge in our course) in an honorable and straightforward manner. **Honesty and integrity are expected on all tasks in this course (HW, exams, etc.); violations may result in a score of 0 for all involved.**