

# MTH 225 Syllabus, Spring 2022

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*Instructor:* Robert Talbert, Ph.D., Professor of Mathematics

## How to use this syllabus

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This document contains all the information you need to navigate the course. **This syllabus is meant to be read once, then searched as needed.** If you need to find something, use the table of contents found in the left sidebar of the web version. Click "Expand All" to see the subsections in the table. You can also hit `Control-F` to bring up a search field, and then type in the text you are looking for.

- When you see blue- or purple-underlined text in the syllabus or any other document, it's a clickable link. For example, [click here for a cat video](#).
- Links to all important documents and information can be found on the course Blackboard site and also on our **Class Page**, which you can access [by clicking here](#). The Class Page will also contain links to daily assignments, a record of what we do in class each day, and more.  
**Bookmark the Class Page in your browser and check it daily.**
- The syllabus is available in electronic form and as a PDF. The electronic version will be consistently updated as needed, with updates **highlighted yellow like this**. *The PDF version will only be updated occasionally and you should use it only for archival purposes.*

## Key Information

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**Meetings:** MTWR 1:00-2:30pm ET, on Zoom. [Click here to join the Zoom meeting](#); this link is also on the [Class Page](#) and on Blackboard.

**Student drop-in hours:** MTWR 2:30-3:15pm ET, on Zoom.

No appointment is necessary for drop-in hours; [just click here to join the meeting](#). The drop-in hours Zoom link is also on the [Class Page](#) and on Blackboard. Additional times are available by appointment; [schedule those using my Calendly page](#).

**Contacting the prof:** Email ([talbertr@gvsu.edu](mailto:talbertr@gvsu.edu)) is preferred; you can schedule a phone call through [my Calendly page](#). Be sure to read [my availability/response policy](#).

**Course calendar:** The official course calendar is in [Appendix B](#), linked on the [Class Page](#) and on Blackboard. *In case of a date conflict on assignments or course documents, the Class Calendar is assumed to be correct.*

**Definition of "week":** In our course, a "week" is defined to begin at 12:01am ET on Monday and end at 11:59pm ET the following Sunday.

**Textbook and videos:** The textbook is [Discrete Mathematics: An Open Introduction](#) by Oscar Levin. It's free; just click the link. A PDF copy is available for download [here](#). A playlist of instructional videos for the course is available [on Vimeo at this link](#).

**Software:** You will need to create an account on [Perusall](#), a web tool used for commenting on PDFs and videos. Our class code is `TALBERT-WDT74`. You will also need to create an account on [Miro](#), our online whiteboard tool.

**Required technology:** For our class, you *must* have access to:

- A laptop or tablet computer
- A high-speed internet connection
- A webcam and microphone

You are *strongly encouraged* to have a device with a touchscreen and stylus input, or an external drawing pad, for handwritten work at an online whiteboard. If technology access is an issue for you, please let me know so we can discuss your options. [Click here for a full list of tech skills and equipment expected of all students in GVSU online courses](#).

**Blackboard and announcements:** Our Blackboard page is at <https://lms.gvsu.edu>. Announcements will be posted on Sundays and Wednesdays and other times as needed. *Be sure to check announcements, email, and the calendar at least once daily.*

## About the Course

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In Discrete Structures for Computer Science 1, you'll be learning **the math that computer science is built on**. You'll learn things like how to do arithmetic in binary, how to count the number of ways to deal a five-card poker hand, and how to generate complex data structures using simple rules involving recursion. And more! By studying discrete structures, **you'll gain a superpower to make you an expert learner** of any hardware and any software, including those that haven't been invented yet.

Your success in the course depends on three things:

1. **Your willingness to be actively engaged during class time.** All the available research on learning says that the only way to learn is to be an active participant in the process. Active engagement means everything from keeping your camera on during meetings, to asking and answering questions during and between classes, and being actively involved during in-class breakout group work. Students who approach the class with a passive mindset typically struggle, and often fail. Those who approach it with an active mindset, on the other hand, often surprise themselves with how much and how well they learn.
2. **Your willingness to ask questions.** The material in MTH 225 is challenging, and it is 100% certain you will be lost, confused, and/or stuck at times. **This is not a defect -- it means you're doing the course right.** When it happens, don't wait for things to make sense on their own: *Ask questions* of me and your classmates and take action to make sense of the material.
3. **Your ability to keep current and maintain awareness in the course.** Being a six-week course, the class moves at a *very* rapid pace. A week in our class (360 minutes of class time) is over *two weeks' worth* of class time in a regular semester (300 minutes). It's easy to fall behind quickly, and difficult to catch up. To avoid this, check your messages and the calendar at once daily; get to

work immediately on assignments; and above all **stay active, ask questions** and **don't procrastinate**.

If you can commit to these three things, then there is every expectation that you'll succeed in the course, no matter what your math background or perceived math skill is.

**My #1 job as the professor is to make sure you succeed in learning.** Success in the course doesn't come cheap. Like learning to program, learning math involves hard work, a willingness to try things that might not work the first time, and the ability to improve using feedback. **But I promise you that I will work to make MTH 225 a class where you can make mistakes and grow safely and productively.**

## Course Goals

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The overall goal of MTH 225 is to **build a solid foundation in the basic theory and tools for the mathematics that computer science is built on**, especially the theory and tools you will need for later coursework such as MTH 325 and CIS 263.

### Course-level learning objectives:

Upon completion of MTH 225, you will be able to:

- Represent integers using different number bases, and perform integer arithmetic using different bases and modular arithmetic.
- Formulate, manipulate, and determine the truth of logical expressions using symbolic logic.
- Formulate and solve computational problems using sets and functions.
- Formulate and solve complex counting problems using computational thinking and the tools of combinatorics.
- Evaluate numerical and other sequences using recursion, and solve simple recurrence relations.
- Write clear, correct, and convincing arguments to explain the correctness of a solution using combinatorial proof and mathematical induction.
- Explain the reasoning behind solutions to computational problems clearly to an appropriate audience.
- Apply effective problem-solving skills in solving computational problems.
- Apply computer programming and computational thinking to frame and solve mathematical and computational problems.
- Self-assess one's work and apply feedback from others to make improvements in that work.

### Course module structure

The course content is split up into five modules:

- **Module 1: Computer arithmetic.** Representing integers in binary, octal, and hexadecimal; binary arithmetic; two's complement notation for negative integers.
- **Module 2: Logic.** Logical propositions, conditional statements, truth tables, predicates, and quantification.
- **Module 3: Sets and functions.** Set notation and representation, set operations, functions (including special computer science functions).
- **Module 4: Combinatorics.** The Additive and Multiplicative counting principles, the binomial coefficient, permutations, dots-and-dividers counting methods.

- **Module 5: Recursion and induction.** Numerical sequences in closed-formula and recursive forms, solutions to recurrence relations, the Principle of Mathematical Induction and proof by induction.

The basic skills that you'll learn in the course are encapsulated in a list of **21 Learning Targets**, eight (8) of which are labelled as **CORE** targets and represent the eight essential skills that every MTH 225 student should possess by the end of the course. [You can find that list in Appendix A](#), and it's linked elsewhere on our various course sites.

## MTH 225 Workflow

Each class meeting has activities for you to do *before*, *during* and *after* the class. For details on specific assignment types, see the next section.

- **Before class:** You'll be asked to complete a **Daily Prep** assignment that will involve you in reading a section of [the textbook](#) and watching some of the videos at [our playlist](#). You'll be engaging in questions and discussion about these using [Perusall](#), and completing a small set of basic questions and exercises on a Google Form. This way, you'll come to class ready to work, and we can skip the lecturing in class unless it's really needed.
- **During class:** Class meetings will be focused on *answering questions* and *doing active work*, both intended to make it easy for you to make sense of the material and ask questions. We'll also use time in class for assessment and for completing other assignments, so that a lot of the "homework" for the class is done during class time.
- **After class:** In addition to getting started on the next Daily Prep, you should expect to spend significant time in between classes doing practice on concepts you don't fully understand yet, and asking questions. There will occasionally be **Application and Extension Problems** (AEPs) to work on as well. But, most of the work you do outside of class will be on Daily Prep.

Our class meetings are 90 minutes long. To keep our energy up, we'll structure our time in **30-minute blocks** (25 minutes of heads-down work followed by a 5-minute break):

Time	Focus
1:00-1:30	Q&A and review on the Daily Prep assignment; and a 5-minute break
1:30-2:00	Focused group work on the main concept of the day; and a 5-minute break
2:00-2:30	Focused active learning on whatever needs it the most -- and wrap-up for the day

[Click here to learn more](#) about the time management technique that underlies this "25+5" approach.

## Assessments and Grades

You can only learn by doing things. The things you will do to learn include many things that are not assessed or graded, along with some items that are formally assessed and graded. These are:

- **Daily Prep assignments:** These lead you through an active reading of portions of [the textbook](#) and some of [the videos](#). You'll use [Perusall](#) to engage in discussions and questions on these, and complete a short form with basic exercises and questions.

- **Learning Target completions:** Learning Targets are the basic skills that you should learn in the course. You will be asked to "complete" as many Learning Targets as possible, done mainly by taking short quizzes on them at regular intervals. See "Learning Targets" below for more.
- **Application and Extension Problems (AEPs):** AEPs are problems that either *apply* or *extend* the basic skills found in the Learning Targets. They involve solving new-to-you problems and communicating your reasoning clearly to an appropriate audience.
- **Online Practice:** You'll use the WeBWorK online homework system to practice the skills found in the Learning Targets. [add link once WeBWorK is set up](#)
- **Final Exam:** We'll have a final exam from **1:00-2:30pm ET on Tuesday, June 21** that involves reassessing on a selection of Learning Targets and completing additional tasks. More information on this in week 3.

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## About the grading system in MTH 225

The way we do grades in this course is a little different than you might be used to. Please read this part carefully and ask questions as needed.

As a teacher and learner, I strongly believe that **learning takes time** and that grading your work based on a single point of data such as a single quiz or test is not only inaccurate, but invalid and even unethical. A truly valid measure of learning has to involve **multiple attempts** that allow you to learn from your past mistakes and demonstrate not only your skill, but also your growth; and you should not be penalized for having a bad day that results in a bad test score, so long as you can show evidence that you've *eventually* learned what you need to learn.

I also strongly believe that **assigning points to your work is deeply unhelpful** for all parties involved. Points give the appearance of a scientific measurement, but in reality *all grading involves a judgment call by the instructor* based on their professional expertise. And points lead to arguments about points and "grade grubbing", both of which are gross. So rather than try to pretend otherwise, I believe your work should be evaluated just like everyone else's work in the real world is evaluated: Have *clearly defined standards* for quality, then I *give detailed verbal feedback* on your work instead of points, then *give you the opportunity to try again* based on the feedback. This gets you into a **feedback loop**, a conversation between you and me about your work, that continues until your work meets the standards.

So in MTH 225:

- *There are no points on your work* except for WeBWorK and the final exam. (Daily Prep is recorded 0 or 1 but that's not a point, that's a label.)
- What you get instead of points is a *simple mark* that summarizes your current progress on the work, and *detailed verbal feedback* on what went well and what needs attention.
- *There is also no partial credit* awarded on your work, because there's no points. (Some WeBWorK questions may receive partial credit if they are multi-part.)
- What you get instead of partial credit is *the ability to revise and resubmit almost any piece of work*, several times over if needed, using the feedback at each stage to improve and grow.

This is not as weird as it sounds. **It's actually the way all human learning works, and the way most professionals are evaluated in their work.** It only seems strange because it's not how school is typically done. But school and the real world are, well, not necessarily aligned. We will take the "real world" approach.

Keep reading for more details.

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## How each assignment is graded

Each kind of graded assignment is different, and here is how each is graded:

Assignment	How it's graded	What's recorded in Blackboard
Daily Prep	Completeness and effort only	<b>1</b> for complete, good-faith effort; <b>0</b> otherwise
Learning Targets	Completeness and correctness	<i>Successful</i> or <i>Retry</i> (see below)
AEPs	Completeness, effort, correctness, and communication quality	<b>E</b> , <b>M</b> , <b>R</b> , or <b>N</b> (see below)
Online practice	Correctness	N/A, these are recorded in WeBWork and not ported to Blackboard
Final exam	Completeness, effort and correctness	Points, 70 maximum

[The "Standards for Assessments in MTH 225" document](#) contains details on the quality standards for each kind of assessment in the course. Please read this carefully and review before each submission you make.

## Learning Targets

A main goal for you in the class is to demonstrate skill on the [Learning Target](#). The primary way you'll demonstrate skill is through **Learning Target quizzes**, given 1-2 times per week. Each quiz contains several problems, and each problem covers exactly one of the Learning Targets. Work on a quiz problem for a Learning Target with only a limited number of errors will constitute a "successful demonstration" of skill and will be marked *Successful*. Work on a Learning Target quiz problem that doesn't meet the standards will be marked *Retry*, and you'll have a chance to try again later after further study and practice. See the [Standards for Assessments document](#) for the details on what you'll be asked to do for each Learning Target and the precise criteria for success.

**Each Learning Target requires two successful demonstrations of skill.** Once you've successfully demonstrated skill twice on a Learning Target, the Target is **completed** and no further assessment on that target is necessary.

Each quiz is **cumulative**, meaning that it will contain problems for each *new* Learning Target along with *new versions* of quiz problems for earlier Learning Targets. **You do not need to do all the problems on each quiz;** just attempt the problems for Learning Targets that you haven't completed yet and feel ready to try.

Your work on Learning Target quizzes will be done by hand, then scanned and uploaded to Blackboard. You will be responsible for keeping track of how many successful attempts you've made, although I will update you on your records around week 4.

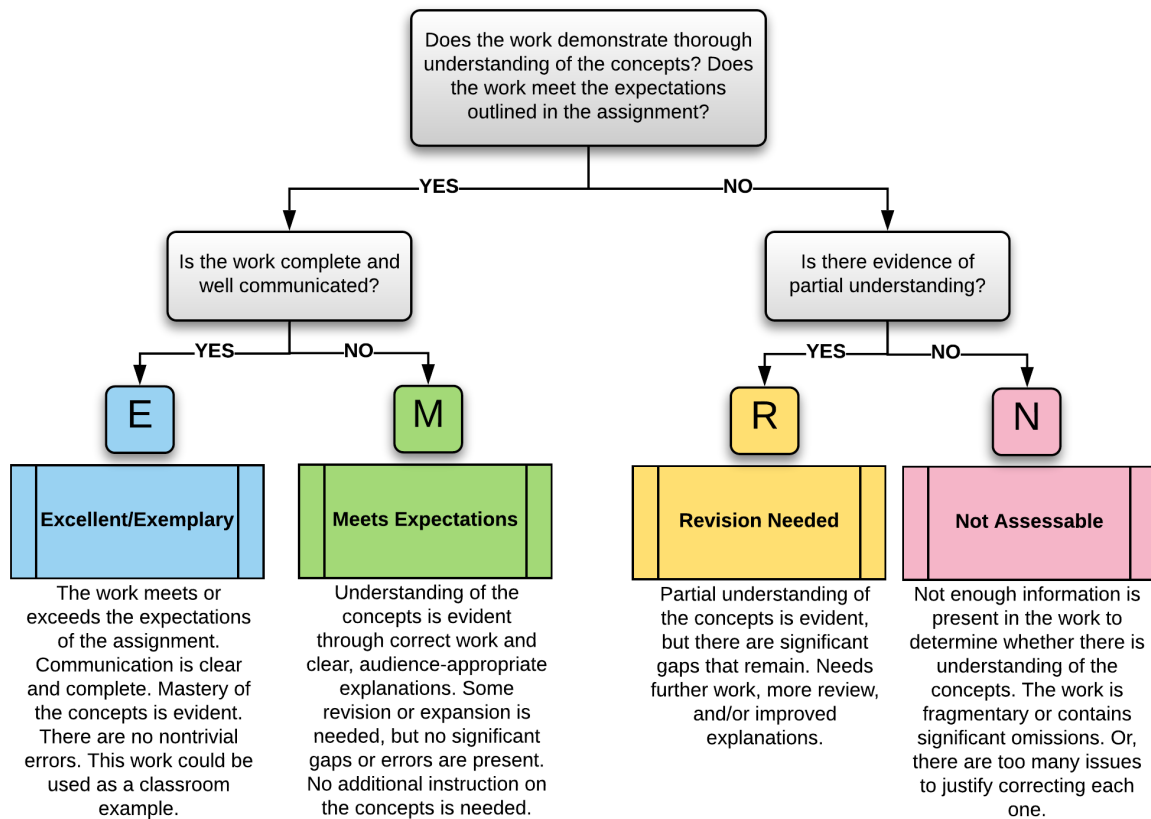
**Alternative ways of demonstrating skill on Learning Targets:** You can also demonstrate your skill on a Learning Target in the following ways other than quizzes:

- *An oral quiz in drop-in or appointment hours.* In this option, you schedule time with me to meet online, during which I'll give you a new instance of a problem, and you work it out "live".
- *A video posted to Flipgrid.* In this option, you request a Learning Target, and I'll give you a new instance of a problem for it, then you make a brief video of the solution and post it to the service [Flipgrid](#).

Details on these will be sent out in week 2. Other ways of demonstrating skill may be introduced later, especially for Learning Targets appearing near the end of the course.

## **AEPs**

AEP sets are assigned occasionally. You are free to work as many or as few of these as you want, although a course grade of B or higher requires acceptable work on at least one of these. They involve more in-depth problem solving and writing and are graded on a four-level rubric:



EMRN rubric based on the EMRF rubric, due to Rodney Stutzman and Kimberly Race: <http://eric.ed.gov/?id=EJ717675>  
EMRN rubric by Robert Talbert is licensed under CC BY-SA 4.0



## Earning a Course Grade

Your grade in the course is determined by how many requirements for each kind of assessment you eventually meet. To earn a course grade, satisfy all of the requirements in the row for that grade in the table below:

	Learning Targets completed (21)	All 8 Core Learning Targets complete?	AEP marks	Online practice (60+)	Daily Prep (20)	Final Exam score (70)
A	18	Yes	1 E and 1 M+	50	17	42
B	15	Yes	1 M+	42	14	35
C	12	No	none	34	11	28
D	9	No	none	26	8	21

Numbers in parentheses indicate the total number of assignments or points available. "M+" means "Either M or E". A grade of "F" is assigned if *not all of the requirements for a D are met*.



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**Example:** Alice finishes the semester with the following things accomplished:

- She's completed (= done two successful demonstrations of skill on) 16 Learning Targets, including all 8 Core targets.
- She's submitted three AEPs, with marks of E, R, and N.
- She's completed 62 points on WeBWork for online practice.
- She's completed 15 out of 20 Daily Prep assignments.
- And she earned a 55/70 on the Final Exam.

Looking across the row for a grade of "B", she has satisfied all the requirements for that grade. Her work on Online Practice and the Final Exam is at "A" level. But since she fulfilled all the requirements for a B, she gets a B in the course; but not an A, because not all of the requirements for that grade were met.

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**Plus/minus grades:** To earn a "plus" grade, complete all the requirements for a basic letter grade **and** the requirements for the next grade up in at least two of the following: Learning Targets completed, AEP marks, and the Final Exam. A "minus" grade is assigned if you meet all of the requirements for a grade except for one category, and that category is no more than one level lower than the rest.

*Exceptions:* GVSU does not award grades of A+ or D-.

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### **Important facts about this grading system**

- **Different assignments do not "average together".** You can't make up for less-than-great work on AEPs by doing more Learning Targets, for instance. Each course grade requires *consistent quality on all assignments* to earn the grade.
- **Once you have satisfied all the requirements for a grade, you've earned that grade, and it never goes down.** In fact grades only ever go *up* (or remain the same) in this system. Actually it's technically possible to earn a "C" in the course by around week 4.
- **You do not have to do everything.** If you want an "A" in the class, for example, you do not have to complete *every* Learning Target, only 18 of them (as long as you do all 8 Core as part of that).

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## **Revision and Resubmission**

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Except for Daily Prep and the Final Exam, **you can revise and resubmit any work you turn in, without penalty, until it meets course standards.** How this works depends on the assignment:

**Learning Targets:** As detailed above, work on a Learning Target (via a quiz or other means) that doesn't meet the standards for "success" can be reattempted, through work on a new version of the same problem --- on a later quiz, an oral quiz in drop-in hours, or on a video.

**AEPs:** An AEP earning a mark of M, R, or N can be revised and resubmitted by uploading a revised version of the work to the same Blackboard "assignment" folder where it was previously submitted. All versions of the AEP will be kept in that folder for reference.

**Online Practice:** Problems on WeBWork sets can be reattempted as often as needed until the deadline.

## Limitations on revisions

Although there is no penalty for revising and resubmitting work, we place the following reasonable limitations on this:

- **Only two AEP submissions per week are allowed.** This can be new submissions of two different problems; or revisions of two different problems; or one new submission and one revision.
- **Only three (3) revisions of AEPs earning an "N" mark (*Not Assessable*) are allowed during the course.** This includes revisions of work marked "N" where the revision also earns an "N". After the third "N", all other AEP submissions marked "N" may not be revised. (So, always check your AEP work against the rubric to make sure it doesn't fall into the N category.)
- **No revisions are allowed after 11:59pm ET on Sunday, June 19** in order to provide time and space to grade all pending revisions for final course grade determinations.
- **There will be further limitations on Learning Target assessments for weeks 5 and 6** to ensure that there are no last-minute assessment requests. More information on this coming in week 2.

## Academic integrity

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This course is subject to [GVSU course policies](#) and the [GVSU student code](#). This document establishes guidelines and expands and clarifies these policies with respect to all work done in MTH 225 this semester. Be sure to read it carefully and honor it fully.

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The student code defines **academic misconduct** as *any action or behavior that misrepresents one's contributions to or the results of any scholarly product submitted for credit, evaluation, or dissemination*. This includes cheating, collusion, dual submission, falsification, and plagiarism --- as well as any behavior that enables or helps others do these things.

Academic misconduct is a serious matter and carries significant consequences, up to and including failure of the course and possible suspension from the university. In all cases, the guidelines established in the GVSU catalog and GVSU student code will be followed. I reserve the right to discuss the nature and origins of any assignment with any student before assessing it.

Here are the specific parameters for how much and with whom you may collaborate on each piece of graded work in the course:

Assessment	Collaboration allowed
Daily Prep	You are encouraged to collaborate with others, particularly on <a href="#">Perusall</a> via questions and discussion threads. On the response forms, your work must be your own and reflect your own understanding.
Learning Targets	<b>No collaboration is allowed at all</b> --- with other people, or with print or electronic sources.
AEPs	<b>No collaboration is allowed at all</b> --- with other people, or with print or electronic sources other than your textbook, the video playlist, or your notes.
Online practice	You are encouraged to collaborate on these, and you can use outside sources. But your work must be your own and reflect your own understanding.
Final Exam	<b>No collaboration is allowed at all</b> --- with other people, or with print or electronic sources other than your textbook, the video playlist, or your notes.

**There's no need to be academically dishonest here, because you can revise and resubmit almost everything.** Rather than cheat, *ask questions and use the feedback loop* so that you really grow and learn in the course.

## How to Get Help

As mentioned, you will almost certainly find yourself lost, stuck, or confused on *something* in this course, possibly quite often. This is not a defect in your character or intelligence; it's a sign you are being challenged, and you can turn that challenge into real growth by **seeking out help as soon as you need it**.

Make every effort to get yourself unstuck and resolve your questions on your own first. But then:

- [Post a question on the course Padlet](#). To post on the Padlet, just double click in an empty part of the screen and start typing (or upload a photo, etc.) in the note that appears. To ask a question anonymously, make sure you are logged out first. (If an avatar photo appears in the upper right, click on it and then log out. No photo means you're logged out.) You can also answer or upvote other people's questions.
- **In WeBWork sets, click the "Email the instructor" link** and ask your question. This will email me your question with a link to your work so I can see what you're doing.
- For questions on stuff in the textbook or on the videos, [use Perusall to leave a question](#).
- **Attend drop-in hours and ask questions there.**
- [Schedule an appointment through Calendly](#) if drop-in hours don't work for you.
- **Work with a classmate** especially on Daily Prep, as long as you're [staying within bounds on academic honesty](#).

## GVSU Math Center

GVSU's Math Tutoring Center offers both in-person and online (via Discord Voice) tutoring this semester, starting Monday, May 9. You can access the most up-to-date information at <http://gvsu.edu/tutoring/math/>. There you will find current hybrid hours where tutors will be available both in-person on the Allendale campus (MAK A-2-601) and online via Discord Voice. Hybrid tutoring is

available Monday – Thursday 12p-4p. The Allendale Math Center follows the same safety protocols as GVSU classrooms. The virtual center will be open Monday – Wednesday 6p-9p, also via Discord Voice. Bring questions to any center about using technology (calculator or Desmos), on methods and concepts, or on specific problems. All Math Center tutoring is FREE, so stop by early and often.

To access virtual drop-in tutoring, you can use the link in your Blackboard course called Math Tutoring Center or visit our website. Then you will need to click on the “Online Math Tutoring Center” button, which will require a GVSU login. We ask that when you enter our Discord server, please change your username to your first and last name so we can get you signed in and connected with a tutor.

**Tutoring Center Appointments:** GVSU’s Tutoring Center is offering appointment tutoring in-person and virtually. You can sign up for 50-minute tutoring appointments for many mathematics courses. Request a tutor at <http://www.gvsu.edu/tc/> or schedule directly on Navigate. Questions about the Tutoring Center can be directed to [tutoring@gvsu.edu](mailto:tutoring@gvsu.edu).

## Course Policies

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### Attendance, absences, and participation

**Attendance:** Attendance is expected at all class meetings. The pace of the course is such that missing a class will result in falling behind immediately, and it’s very hard to recover given the compressed nature of the schedule. Attendance will be recorded so I can keep track of it.

**Absences:** If you must be absent, you do not need prior permission or justification; a heads-up is appreciated. However *please avoid any non-essential absences* such as skipping class, or scheduling a vacation during a day where class is scheduled. If you miss, you are solely responsible for catching up.

**Missing Learning Target quizzes:** If you miss a class meeting during which there is a Learning Target quiz (these are clearly marked on the Class Calendar), *there are no makeups offered*. Instead, just attempt the problems you intended to take on the next quiz, or through an oral quiz or video.

**Participation in class:** You are expected to participate actively during each class meeting. **Keep your Zoom camera turned on** during all class meetings so that you are fully “present”. (However, please keep your microphone muted unless you have a question.)

### Deadlines and late work

Daily Prep, AEPs, and Online Practice sets all have deadlines. Those are handled in different ways:

- *Daily Preps* must be turned in by the deadline (typically 11:59pm ET the night before class). This deadline may not be extended because of the time-sensitive nature of the assignment.
- *AEPs* have “soft” deadlines --- suggested deadlines that give you something to put on the calendar and motivate you to complete it. If you intend to turn in an AEP set but don’t think you can finish by the deadline, **you can ask for an extension** by emailing me. Tell me what the issue is, and tell me when you plan to turn in the work. Extension requests must be received before the original deadline, and I have the right to refuse or give you a different extended deadline if the situation warrants.
- *Online Practice* sets have a deadline when the system shuts off access to the problem set. **You can request a 24-hour extension for an online practice set, up to three (3) times during the semester.** Just email me; however the extended deadline will be set to 24 hours after the

original deadline, not 24 hours after I get your email, so if you know you'll need an extension then email me as soon as possible about it.

## Technology skills and tech support

You should be proficient in the basic technology skills listed at [this GVSU policy page](#). If you need help at any time with those skills, please ask me or a classmate.

**Tech support:** Technology issues will happen with almost 100% certainty, usually at the worst possible moment. **When this happens, do NOT contact me first!** Instead, contact the appropriate person or office listed below:

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- For help with **Blackboard:** Email the Blackboard Help Desk at [bbadmin@gvsu.edu](mailto:bbadmin@gvsu.edu) or call (616)331-8526. For hours of operation and more information see <http://www.gvsu.edu/elearn/help>.
- For help with **the GVSU network, email, or printing:** Email the GVSU IT Help Desk at [helpdesk@gvsu.edu](mailto:helpdesk@gvsu.edu); or call (616)331-2101 or toll free (855)435-7488. For hours of operation and more information see <https://www.gvsu.edu/it>.
- For help with **your computer:** Try the GVSU IT Help Desk (above) or contact your device's manufacturer or a computer store.
- For help with **Perusall:** Contact **Perusall Help** at <https://support.perusall.com>.
- For help with **Miro:** Search the knowledge base at the Miro Help Center (<https://help.miro.com/hc/en-us>) or in the Miro Community Forum (<https://community.miro.com/>), or ask a friend.
- For help with **any other technology:** Ask a question of a classmate (or me), seek out the help documentation in the tool you are using, or do a targeted Google search.

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**I (Talbert) am not able to provide tech support** since I lack the skill and permissions to fix all possible problems.

**If technology issues prevent submitting work:** If you have contacted an appropriate source of help and an issue still persists that prevents you from turning in work in the usual way (for example on Blackboard), **you are expected to take alternative measures to get your work turned in on time.** For example, if Blackboard is offline and a deadline is looming, send an email with an attachment. Then, submit the work using the normal means later. If Zoom isn't working on your computer, try joining the meeting on your phone.

## Instructor availability and message responses

**You have a right and the responsibility to ask a question about anything you don't fully understand, at any time.** To ask me questions, you can use email ([talbertr@gvsu.edu](mailto:talbertr@gvsu.edu)), [the course Padlet](#), or drop-in hours or appointments.

I do not always respond to all messages immediately because I have to prioritize a number of tasks throughout the week that make demands on my time; and I do not leave my email open all day.

I typically respond to email and Padlet posts **once per day** in the late afternoon. If you send a message on a weekday (Monday through Friday) before 4:00pm ET, it will get a **same-day response**. Messages sent after 4:00pm on Fridays or on the weekends will get a response **no later than the following Monday afternoon**. Please note: If you have a significant question over a weekend, your best bet is to post it to [the course Padlet](#) where it will be seen by the entire class, so you might get an answer before Monday.

## Special accommodations and basic needs

If you have special needs because of learning, physical or other disabilities, it is your responsibility to contact Disability Support Resources (DSR) at (616)331-2490 or <http://www.gvsu.edu/dsr/>. DSR will help you arrange accommodations. Then, speak with me in person about making those accommodations and ensure that they are consistent with your arrangements with DSR.

If you have difficulty affording groceries or accessing sufficient food to eat every day, or if you lack a safe and stable place to live, I encourage you to visit Replenish, a food resource for GVSU students. If you are comfortable doing so, please speak with me about your circumstances so that I can advocate for you and to connect you with other campus resources.

If, for purposes of gender identity and expression, your official name (in Banner) does not match your preferred name, your name can be updated in Blackboard. Please contact the registrar's office to submit this request. The registrar's office will contact the Blackboard administrator to make the change and will also contact your professors to inform them that your name in Banner will not match the name in Blackboard.

## FAQs

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:::info

This list will be added to throughout the semester as issues arise. Check back often!

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Changes to this syllabus may occur during the semester. In those cases, the changes will be announced in class and online, and if appropriate, students will be given a voice on how the changes will be implemented. Again it is your responsibility to attend class and process all the information passed along in course announcements so that you will be aware of any changes that take place.

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## About the instructor

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I'm Robert Talbert, the professor for this course. I'm a Professor of Mathematics and also work in the president's office as Presidential Fellow for the Advancement of Learning. This is my 30th year of teaching overall (not counting tutoring gigs). I have a Ph.D. in Mathematics from Vanderbilt University and a B.S. degree from Tennessee Tech University.

I was, at best, a thoroughly mediocre math student in school until my senior year of high school, when I had a teacher for Calculus (hi, Mrs. Allen) who stopped trying to cram things into my head and instead showed me the basics and then backed off, and let me work with things (with support if I got stuck) until I came to my own understanding of them. Basically, this is how I teach today.

After a two-year gig as a Psychology major in college, I changed my major to math after a late-night dare from my roommate (long story) and, to my great surprise, I fell in love with the subject. I ended up getting a Ph.D. working in an obscure area at the intersection of abstract algebra and geometry, and I also discovered I loved teaching math to college students. So I went on to spend 14 years teaching in small liberal arts colleges before coming to GVSU.

Now, I teach computer scientists and engineers how to think like mathematicians, do research on how to make college teaching better, and coordinate large-scale teaching/learning projects for President Mantella's office. When nobody is looking I am always trying to build my skills in Python, data science, and project management.

I live in Allendale with my wife, three teenage kids, and three cats. I am a halfway-decent cook, a longtime bass guitarist, and lover of the outdoors. I aspire to spend more time in a kayak or on a bike than in front of a computer. You can read more about what I'm thinking and doing at my website, [rtalbert.org](http://rtalbert.org), or at my "other blog" [Grading for Growth](#) about alternative grading practices which I co-author with my GVSU colleague Prof. David Clark. I'm also on Twitter at [@RobertTalbert](#) and on [LinkedIn](#). I will accept any connection request on LinkedIn from a student!

## Appendix A: Learning Targets

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There are 21 Learning Targets in the course overall. These represent the basic skills that are available to learn in the course. Of those, eight (8) are labeled as **CORE** targets.

1. I can represent an integer in base 2, 8, 10, and 16 including negative integers in base 2.
2. **(CORE)** I can add, subtract, multiply, and divide numbers in base 2.
3. I can construct a truth table for propositions involving 2, 3, or 4 statements.
4. I can use a truth table to decide if a statement is a tautology or contradiction, or to determine if two statements are logically equivalent.
5. **(CORE)** Given a conditional statement, I state its hypothesis, conclusion, negation, converse, inverse, and contrapositive.
6. I can determine the truth value of a predicate at a specific input, and given a quantified predicate I can state its negation and its truth value.
7. **(CORE)** I can write a set using roster and set-builder notation.
8. **(CORE)** I can find the cardinality, power set, and complement of a set; and I can find the intersection, union, difference, and Cartesian product of two sets.
9. I can determine if a mapping is a function; identify the domain, range, and codomain of a function; and determine the image of a specific input.
10. I can determine if a function is injective, surjective, and/or bijective.
11. I can determine the values of an inverse function and the composition of two functions.
12. I can compute values of the functions `FLOOR`, `CEIL`, `DIV`, `% (MOD)`, and `!` (`FACT`).
13. **(CORE)** I can apply the Additive and Multiplicative Principles and the Principle of Inclusion/Exclusion to formulate and solve basic combinatorics problems.
14. **(CORE)** I can compute a binomial coefficient and apply the binomial coefficient to solve basic combinatorics problems.

15. I can determine the number of permutations of a set of objects and the number of  $k$ -permutations from a set of  $n$  objects.
16. I can use the "dots and dividers" method to count the number of ways to distribute objects among a group.
17. **(CORE)** I can generate several values of a sequence given either a closed-form or recursive definition.
18. I can use "sigma" and "pi" notation to find the sum and product of a sequence of numbers.
19. I can find closed form and recursive definitions for arithmetic and geometric sequences.
20. I can solve a second-order linear homogeneous recurrence relation using the characteristic root method.
21. **(CORE)** Given a statement to be proven by mathematical induction, I can identify the predicate, prove the base case, state the inductive hypothesis, and sketch a proof.

## Appendix B: Class Calendar

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The calendar can be accessed directly [at this link](#); it is also available on Blackboard.