MAT 1010: Introduction to Mathematics

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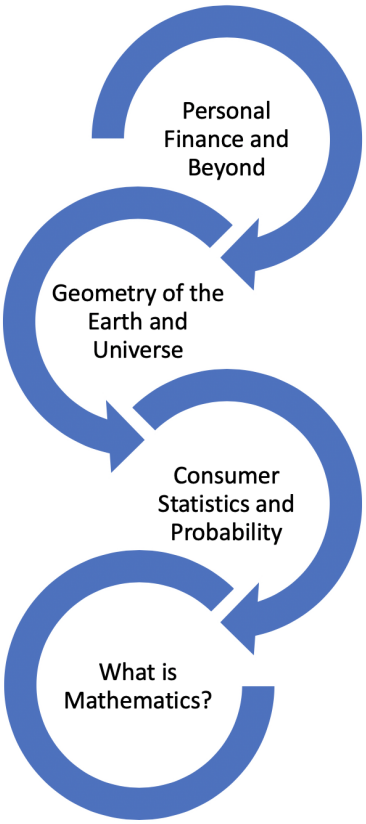
1.1 Course Goals

You'll receive full general education quantitative literacy credit while developing a liberal arts appreciation of mathematics via an interdisciplinary and thematically linked format and a focus on local to global connections as you develop creative inquiry skills, research techniques, and communication skills. You'll also develop an appreciation of what mathematics is, has to offer, how it is useful, how it contributes to an understanding of truth and consequences, and the diverse ways that people can be successful and impact mathematics (including you!), as we study:



- *Personal Finance and Beyond* How we apply algebra to interest formulas and decisions we make about our own lives.
- *Geometry of our Earth and Universe* How we measure and view the world around us and decide what is the nature of reality.
- *Consumer Statistics and Probability* How probability and statistical techniques allow us to recognize the misrepresentations of studies and make public and private policy decisions.

- *What is Mathematics?* To reflect more broadly about the course themes as we tie the segments together. You can choose a topic you are interested in and research how mathematics relates to it or you can design a creative review of what we covered in class. You will communicate your expertise in a poster presentation session.

- *Interdisciplinary*: Each segment is explored through the lenses of numerous disciplines, which we will compare, contrast and connect to mathematical and statistical thinking. These include:

  - Finance: business, economics, ethics, history, mathematics, philosophy, statistics
  - Geometry: art, astronomy, geography, history, mathematics, philosophy, physics, religion, statistics, visualization
  - Statistics and Probability: ethics, communications, history, medicine, political science, psychology, sociology, visualization

- *Thematically Linked Format*: The segments are tied together through the following themes:

  - what mathematics is, what it has to offer and how it is useful
  - the diverse ways that people succeed in and impact mathematics
  - truth and consequences-what is truth? When are we convinced? What are the consequences of certain truths? What is the role of chance and probability?

- *Local to Global Connections*: We'll identify quantitative connections within local and global geographical regions, including:

  - Financial economic indicators: local: individual and North Carolina; global: US and world
  - Geometry: local: small piece of land; global: earth and universe
  - Statistics and Probability: local: personal and NC; global: US and world, such as "math gene" idea in US but not in Asia

  We'll also compare and contrast small-scale and large-scale mathematical regions, such as:

  - Finance: local: simple interest; global: compound interest
  - Geometry: local: Euclidean; global: earth and universe
  - Statistics: local: summary statistics; global: scatterplot

- Catalog description: A course in mathematical problem solving for students who are not required to take calculus. Emphasis is on the development of students? quantitative literacy and number sense rather than computational drill. Computational tools such as spreadsheets will be used to solve a variety of real world problems. All sections cover basic consumer statistics and probability, with additional topics drawn from a variety of fields such as art, music, finance, physical or biological science, geometry, cryptology, measurement, and election theory.

- QL Curricular Components:

  - Communicate quantitative ideas and concepts using a variety of representations, including numerical, graphical, and algebraic
  - Demonstrate number sense and recognize quantitatively reasonable and unreasonable solutions to problems
  - Recognize situations where quantitative methods can be used to model and solve problems, and employ appropriate tools (specifically technology) in formulating, analyzing and solving those problems
  - Recognize and draw upon connections between the mathematical sciences and other disciplines, and between the mathematical sciences and life experiences

  - Collect and interpret quantitative data in order to draw appropriate inferences, understand the role of chance in data collection and statistical inference, and question and validate assumptions.
  - Develop the ability to think critically and creatively about the relationship between local regions and global issues, processes, trends, and systems

- Learning Outcomes: We will communicate quantitative information, including graphs, tables, and mathematics and statistics formulas in written documents or presentations. This course poses almost every mathematical problem in a real-world context. In addition, many of the problems are open-ended, allowing for several paths to a solution. We will develop skills in recognizing patterns in mathematical information, and become logical, flexible, critical thinkers and problem solvers who thoughtfully consider the reasonableness of their solutions. We will develop skills in recognizing patterns and similarities in numerical, algebraic, and graphical representations and using those representations to solve real-world problems and employ technology such as spreadsheets, scientific calculators and graphing software, and statistical and mathematical programs. We will explore applications of mathematics and statistics in everyday life and examine course topics through a combination of theoretical derivations, problem solving and analysis, and real-life connections. We will compare and contrast small-scale and large-scale mathematical regions and identify benefits, limitations, similarities, differences, or connections in course discussions, assignments, exams, or projects. We will identify quantitative connections within local and global geographical regions and study similarities, differences, or connections during class homework, discussions, or activities.

1.2 Course Communication

- Zoom Hours and ASULearn Need Help Forum: My Zoom hours are typically 10:20am & 12:20pm M–F, and 8pm S–Th. You do not need to make an appointment to use Zoom hours—just drop by and I am happy to help! If no one is there I will log off after a few minutes. If you can't make Zoom, you can contact the entire class on this forum, and respond to each other, or contact me privately by e-mail. I strive to answer individual questions at least once a day, including the weekends, although I may respond within a class announcement in that forum. Set your forum preferences (under preferences/user account/forum preferences) to Forum tracking—Yes: highlight new posts for me, and When sending forum post notifications—Do not mark the post as read to ensure you will notice new posts from me and your classmates. I prefer that you use Zoom hours as it is easier to discuss material in person. If you wish, let me know and I can set up a separate Zoom link for you so that you can arrange study groups or other meetings with people in our class.

- Check ASULearn daily for work.

- Communicating about Work for Missed or Excused Absences: If there is some reason you must miss a class or assignment, then keep me informed, with any appropriate documentation, and obtain the assignment and class activities from the web pages to turn the work in early or on time, if possible.

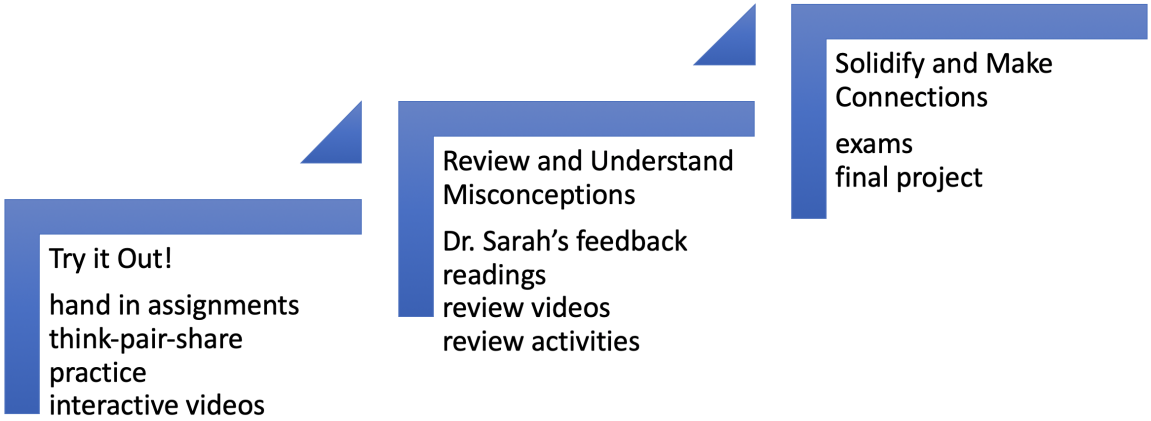
- Inclement weather: If the university cancels classes, check the class web pages for updated info, which may include plans for the missed class such as additional readings, problems, video meetings, Chat, and/or Forum sessions in ASULearn. Homework may still be due on ASULearn.

1.3 Required Resources

- *The Heart of Mathematics: An Invitation to Effective Thinking* by Edward Burger and Michael Starbird available for rental
- scientific calculator which can do powers (y^x or x^y or ^ symbol).
- printouts of your project and single PDFs scanned and created from your work on the handouts I give you
- child's ball - these are usually found in bins in stores and cost a couple of dollars. Be sure that this ball is smooth, can bounce, and that you will not mind writing on it during class. 10–12 inch diameter is ideal.
- reliable access to technology, software, and high speed connectivity

Because this course is 80% online, most of the work you're going to do you'll be accessing though your internet connection with a device, so it will be really important to have a dependable high-speed internet connection, a good computer that can run everything we'll need, and a camera or scanner to scan written work in. You'll need to purchase a scientific calculator with an exponent key, but the other software is free, including Microsoft Excel, because any faculty, staff or student with a valid Appstate e-mail address has access. We'll also use Zoom videoconference software. If you don't already have one you'll also need a webcam, headphones or speakers and a microphone to access Zoom office hours. Flexible browsers that will play common media formats from various sources such as from webpages, Google Drive, YouTube, and ASULearn, including interactive videos, are also something we'll use regularly. You'll also need to access some free software such as a Torus Games app, Birthday Simulation, and more. You may need some flexibility in browsers so that if one browser is incompatible, you can try another. You'll also need to be able to collate written work into a single PDF for certain submissions, like by using a printer/scanner or an app like CamScanner from a phone. Online students are expected to have or acquire proficient computer skills and to resolve their own technology problems related to computers or Internet access. `http://Support.appstate.edu` can help with some issues.

1.4 Assignment Types and Grades



- Effective Class Engagement 40%

  Aside from the face-to-face activities, there is daily work each day at your own pace all due at or before 9am the next day M–F. I mark engagement during the face-to-face component and on ASULearn for a good faith effort rather than for accuracy, and indicate completion via a checkmark ☑. The percentage of checkmarks determines the overall engagement grade (to accommodate for emergencies, the lowest 2 checkmark assignments are dropped) and includes:

  practice with instantaneous feedback check from me, repeatable until the deadline to obtain a checkmark. The point is to practice and examine the feedback to make sure you understand rather than obtain a perfect score. I only use the checks, not the specific score. If you weren't able to succeed then a second chance will open after the deadline, but the checkmark is easier to obtain when it was originally due (70% instead of 90%).

  hand in and I'll respond with feedback within 24 hours from the due date. Some items must be completed on the handouts I give you and collated into one single PDF for submission. See the individual assignment for such instructions. Must be in on or before the cut-off date, which is one day after the due date.* You can revise and resubmit before the deadline as needed if you have earned a Padawan. We'll employ Star Wars terminology as a metaphor—Padawans are training to one day become a Jedi. Jedi Knight is a rank within the Jedi Order, referring to Jedi who complete their training and pass the Jedi Trials to become full members. As a Jedi Master leader you have demonstrated exceptional achievement. Both Jedi and Jedi Master ratings earn a checkmark.

think-pair-share to (1) respond to the questions with your own thoughts and (2) respond separately to someone else's post with something new that justifies your position on (at least) one of the questions. Don't just say, "Yeah, I agree." Instead, say, "Yes, but we also need to consider..." Or, "I don't agree because..." You might also pose questions, answer questions, extend ideas, or compare and contrast your responses and summarize what you chose and why. Both posts must be rated as Jedi for a checkmark (you can revise as needed by completing/revisiting the instructions). If only one of your posts has been rated, you may temporarily see a checkmark before the other is rated. After the deadline, I'll respond to the shared posts within the successive days activities (in the next day or two) or within a class announcement.

H5P interactive video activities, repeatable. To earn credit you'll watch the entire video and submit the correct answers—you'll use the check feature on interactive questions in order to help you so you can redo the responses until you get them correct.

webpages, PDF, files, videos, glossaries or other course activities. Some checkmarks may be ones where you can manually mark the activity as completed whenever you are ready to do so. Other checkmarks may only be earned when you receive a grade or when you access an assignment.

The purpose of class engagement is to learn and practice computational strategies, concepts, and develop critical thinking and problem-solving skills, so you should first try problems on your own. This course focuses on mathematics in context. Real-life considerations can be ill-defined and have multifaceted aspects. Whether it is counting the number of stars, understanding why the Franklin funds never earns 5%, or many of the other concepts we will consider, many cases require the critical and creative analysis of a variety of interpretations in order to fully consider the implications. I understand that this can feel frustrating and uncomfortable and I am here to help you. In return, you are expected to contribute to discussions and activities in a meaningful way. The CBMS published a statement titled "Active Learning in Post-Secondary Mathematics Education" about the importance of "classroom practices that engage students in activities, such as reading, writing, discussion, or problem solving, that promote higher-order thinking" and our classroom is modeled after that. Appalachian's General Education Program prepares students to employ various modes of communication that can help communities reach consensus or respectful disagreement. Successful communicators interact effectively with people of both similar and different experiences and values and in this class you will practice oral and written communication during class by interacting with your peers and me. Regardless of gender, political party, race, religion, sexuality, or more this class is to be a welcoming environment, and so I want you to be sensitive and respectful to each other in upcoming discussions. Performing activities that detract from this welcoming and professional classroom environment or distract your neighbors or me will result in a lowered grade. Making mistakes is integral to the learning process—the key is to try to continue to engage rather than give up. It is on purpose that there are problems that don't look exactly like what we did previously in order to provide you with rich settings to explore in order to learn deeply. Even if you achieved a check you might still have some errors, so be sure to use my feedback to help solidify your understanding.

- Exams 45%
  There are three written exams, in the face-to-face component. To encourage exams as a learning experience, accommodate for emergencies, and help solidify your knowledge, you can turn in revisions on one exam. Otherwise, no late tests allowed.*

- Final Project 15%
  To reflect more broadly about the course themes as we tie the segments together. You can choose a topic you are interested in and research how mathematics relates to it or you can design a creative review of what we covered in class. You will communicate your expertise in a poster presentation session in the face-to-face component. You must participate in the final project to pass the class. No late projects allowed.*

* Accommodations in the determination of your final grade will be made for extenuating circumstances that are documented to prevent you from completing work early/on time.

The grading scale is: $A \geq 93; 90 \leq A- < 93; 87 \leq B+ < 90$...

1.5 Academic Affairs Policies

We adhere to the University-wide syllabus and policy statements:
`https://academicaffairs.appstate.edu/resources/syllabi-policy-and-statement-information`

1.6 Tentative Calendar

- Tues May 28 face-to-face

  Begin Personal Finance and Beyond

- daily work each day at your own pace all due at or before 9am the next day M-F

- Wed Jun 5 face-to-face

  Exam 1

  Begin Geometry of the Earth and Universe

- daily work each day at your own pace all due at or before 9am the next day M-F

- Fri Jun 14 face-to-face

  Exam 2

  Begin Consumer Statistics and Probability

- daily work each day at your own pace all due at or before 9am the next day M-F

- Tues Jun 25 face-to-face

  Exam 3

  Begin What is Mathematics?

- daily work each day at your own pace all due at or before 9am the next day M-F

- Fri Jun 28 face-to-face

  Final Presentations on What is Mathematics?

1.7 Where to Get Help and Additional Policies

I encourage you to talk to me often in class, Zoom hours, and to your classmates on the ASULearn forums. I prefer that you use Zoom hours since it is easier to discuss material in person, but if you cannot make them, then discussing concepts with your classmates in the forum is a great alternative. Asking questions, and explaining things to others, in or out of class, is one of the best ways to improve your understanding of the material and I am always happy to help. This course is to be an environment in which everyone feels comfortable asking questions, making mistakes, offering good guesses and ideas, and is respectful to one another. You should explore ideas and write out your thinking in a way that can be shared with others. Turn in homework and projects and prepare to present problems even if it they are not complete, even if only to say, "I do not understand such and such" or "I am stuck here." Be as specific as possible. Conjecture.

I believe that each of you has the capability to succeed in this course. Since you were able to register for the class, you have somehow showed that you have the required algebraic and other skills, via placement test or other indicators. Yet, sometimes, in order to succeed, we must change certain behaviors, study habits, and/or emotional reactions. We'll see that everyone (including Dr. Sarah and other mathematicians) struggles with mathematics. Success in mathematics is not determined by whether it comes naturally or seems "clear". Instead, success in mathematics is all about learning to use mistakes and material we are struggling with in order to grow. You should expect to put in the necessary time outside of class in order to complete assignments on time. As per the University-wide Statement on Student Engagement with Courses you can expect to spend (on average) 2–3 hours outside of class for each hour in class. In this course, this means spending between 4 hours and 20 minutes and 6 hours and 30 minutes each day, on average. You can expect to spend this time outside of class per week on

assignments and reviewing material. If you find that you are spending fewer hours than these guidelines suggest, you can probably improve your understanding and grade by studying more. If you are (on average) spending more hours than these guidelines suggest, you may be studying inefficiently; in that case, you should come see me.

You are responsible for all material covered and all announcements and assignments made, whether you are present or not.

I also want you to be informed about your choices regarding what you tell me about certain types of sensitive information. In situations where students disclose experiencing an act of interpersonal violence to their instructor, faculty are required to report what students tell us to the campus Title IX Coordinator, who then reaches out to the student by email offering support services. I care about you and want you to get the resources you need. I'm happy to talk with you if you decide you want that, but please be aware that if instead you'd like to explore options with someone who can keep your information totally confidential, I highly recommend the Counseling Center at 828-262-3180. They offer walk-in hours as well as after-hours coverage: `http://counseling.appstate.edu`.

- Appalachian Cares is a place to find updates about matters of student health and safety. It also functions as the most up-to-date clearinghouse of information, resources and support available. `http://appcares.appstate.edu/`.
- Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students, 324 Plemmons Student Union, for a list of resources and support. The ASU Food Pantry and Free Store is a free resource with pantry and personal care items, located in the Office of Sustainability on the bottom floor of East Hall.
- The library offers Research Advisory Program (RAP) sessions. `http://library.appstate.edu/gethelp/rap`
- The Learning Assistance Program provides core services including University Tutorial Services, Academic Strategy Instruction, As-U-R, ACCESS, Student Support Services, and Academic Services for Student Athletes/ `http://lap.appstate.edu/welcome-learning-assistance-program-1`
- AppSync is your one-stop connection to engagement and leadership opportunities at Appalachian State. `https://appsync.appstate.edu/`

Academic integrity is a fundamental part of the course, which includes meeting deadlines, regular communication, and giving proper reference where it is due. These are essential to course integrity. Feel free to talk to me or each other if you are stuck on this assignment, but when writing up work, be sure to give acknowledgment where it is due. Submitting someone else's work as your own (PLAGIARISM) is a serious violation of the University's Academic Integrity Code, which defines: "Plagiarism includes, but is not limited to, borrowing, downloading, cutting and pasting, and paraphrasing without acknowledgement, including from online sources, or allowing an individual's academic work to be submitted as another's work."

Use of interactive technology is allowed only when it is related to our class. Otherwise put cell phones away or place them face down and set them to vibrate. Photos or video or audio recordings may not be taken in class without prior permission. Food and beverages are allowed as long as they aren't distracting, but e-cigs, chewing tobacco/spit cups and other products are not allowed.

In this course, you will be challenged with problems that you have never seen before. I do not expect you to be able to solve all the issues immediately. Instead, I want to see what you can do on your own. Out in the real world, this is important, since no matter what job you have, you will be expected to seek out information and answers to new topics you have not seen before. This may feel uncomfortable and frustrating. I understand this and want to help you through the process. It helps to remember that there are no mathematical dead-ends! Each time we get stuck, it teaches us something about the problem we are working on, and leads us to a deeper understanding of the mathematics. In the real world though, you are not expected to face your work alone. You will be allowed to talk to other people and you may even be expected to work with other people. In this class, you are also not expected to face your work alone. I am always happy to help you and will try to give you hints and direction to help you understand the material. At times though, to encourage the exploration process, I may direct you to rethink a problem and to come back to discuss it with me again afterwards. This occurs when I believe that the struggle to understand is imperative for your deep understanding of the material.

1.8 Advice from Prior Students

- To attend every class and do all the assignments.
- Don't wait until the day of to do the homework because sometimes it will take longer than you think and it might close before you get to it.
- Ask Dr. Sarah for help. She is here to help YOU understand the material and do the best you possibly can. Take notes. Seriously, TAKE NOTES.
- Make sure you check her page everyday to stay on task and keep up with the homework on ASULearn.
- Make sure you take your time to review and ask any questions you have because Dr. Sarah will really help when it comes to that and typically highlights things that will be on the tests. Lastly, do the homework! It always comes up later and is actually important to the class.
- Form a good study group to go over information with for every test, you learn better if you teach others as well. Take notes. Participate in T-shirt day.
- Make sure you know how each topic relates to local and global concepts and the big idea. Before a test, I would recommend redoing homework and the practice tests because they are usually pretty similar to the actual test and are very helpful.
- Begin working on the project as soon as possible, and don't be afraid to ask Dr. Sarah to look over it before you turn it in on the due date.
- Critical thinking is important in each lesson so be able to apply the knowledge. Dr. Sarah will answer any questions you may have.
- look at the glossary when studying for tests.
- Show up to class, do your homework, and take advantage of the tools she gives you for the tests.
- Don't stress too much. Just do your best!
- Pay attention and make sure you copy down the answers for questions. Take advantage of the review sheet. Make sure you know the class material as well going into tests.
- Take extensive notes. This class is not your normal math class, there will not be a whole lot of computational equations to remember (although there will be some). I was not really a "math note taker" before this class because it was typically just scratch work and such but this class has a lot more writing than you may expect so take notes because they will help you make your reference sheet for the tests. Also, taking notes is just a good idea in general because it requires you be attentive while Dr. Sarah teaches.
- Stay on top of the readings
- I would recommend writing everything down. Anything Dr. Sarah says or writes down, you write down. All the information becomes relevant at some point.
- Don't drop out if the first day mostly scares you like it did to me. Just keep going and after a lot of researching, studying, and by asking as many questions as you can, everything will start to make sense.

1.9 Instructor Bio

I am a full Professor of Mathematics, and I am also an affiliate of Gender, Women's and Sexuality Studies (GWS), investigating the connections between mathematics and society, like the show *Futurama*. My PhD is from the University of Pennsylvania. I am married to the bassist Joel Landsberg. In our spare time, we like to travel, hike and conduct genealogy research. In addition to my own personal genealogy, I like to give back to the broader community, and in this context, I am affiliated with ASU's center for Judaic, Holocaust and Peace Studies. Some of what I like about mathematics is also what I enjoy about genealogy—the sense of exploration, discovery and aha moments that come with lots of patience and effort.