

Contents

WRC 1010: Introduction to Mathematics

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1.1 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 \wedge symbol).
- scanning handwritten work: for labs, the course is designed so that you'll collate handwritten work into one full size multipage PDF. You can electronically annotate a PDF using an electronic stylus, or write on the paper copy I give you and scan and collate it into a PDF, like by using Adobe Scan or CamScanner from a phone. You can also use many printers or photo copiers to scan to PDFs—the school library lists that as an option and they can help: <https://library.appstate.edu/services-search/print-zone-tech-help>.
- reliable access to technology, software, and high speed connectivity

The work you're going to do outside of class you'll be accessing though your internet connection with a device, so it will be really important to have access to a dependable high-speed internet connection, a good computer that can run everything we'll need, and a camera to scan written work in. You'll need a scientific calculator with a power or exponent key, but the other software is free, including Microsoft Excel that we'll use during labs, because any faculty, staff or student with a valid Appstate email address can access Office 365 on their own computer or on campus computers. For optional office hours, we'll use Zoom videoconference software and for the final project you'll be making a video project. 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. We'll also access some free software such as a Torus Games app, a Birthday Simulation, and more. You may need some flexibility in browsers so that if one browser is incompatible, you can try another. <http://Support.appstate.edu> and <https://confluence.appstate.edu/display/ATKB/Appalachian+Technology+Knowledge+Base> can help.

1.2 Assignment Types, Grades, and Policies



- **Effective ASULearn Engagement 50%**

I mark ASULearn for a good faith effort rather than for accuracy, for completion. The percentage of completed activities that are done at a passing level determines the overall engagement grade (to accommodate for emergencies, the lowest 3 checkmark assignments are dropped). Activities may include  hand-ins, quizzes, forums, surveys, begins, glossaries, videos, web pages, PDFs... Completion activities may be ones where you can manually mark the activity as completed or are earned when you access an activity or receive a proficient grade by a deadline. For example,  practice with instantaneous feedback check from me are repeatable until the deadline to obtain completion. 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 I see on my end, not the specific score. If you weren't able to succeed by the first deadline then a second chance will stay open until the relevant exam, but completion is easier to obtain when it is originally due (70% instead of 90%). No lates allowed*.

- **Exams 30%**

There are three exams over the course of the semester. Each exam has an individual component as well as a component where you can work in groups. You work alone until I collect the individual part of the exam and say it is “group time.” Then you may continue to work alone or in groups (or a combination!). The idea is to give you opportunities to communicate course content with your peers, since this is one of ASU's main educational goals: 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. Part of the welcoming environment is to keep an open mind as you engage in our class activities and explore current mathematical/scientific consensus. The only guidelines are that each person must eventually write up and turn in their own, the only resources you are allowed to use is each other, and you should spend the time inside the classroom effectively engaging. To encourage exams as a learning experience, accommodate for emergencies, and help solidify your knowledge, you can turn in revisions on one exam toward the end of the semester. Otherwise, no late exams 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 video presentation and learn from your classmates by conducting peer review and self-evaluation during our assigned time at finals for the Tuesday/Thursday class, which is Tuesday December 13th from 2–4:30. As on https://facultyhandbook.appstate.edu/sites/default/files/faculty_handbook_2022.pdf “an instructor may NOT change the date or time of an examination without permission of the departmental chair and dean... Permission is granted only in case of emergency.”

- **Effective Class Engagement 5%**

Effective class engagement is essential to course integrity. There are activities we can only do when we are all together on Tuesdays and Thursdays and these will form a portion of your grade. Attendance is required at ALL such classes, with the exception of legitimate or excused absences. If you must be late to a class, or must leave early, then do still attend. You are also expected to take notes and contribute to discussions, activities, and *pollev* polling questions in a meaningful way. For the Tuesday and Thursday classes, it will be useful if you bring a computer, tablet, or phone that can access webpages—if not, you can still participate in the polls in other ways. Asking or answering related and thought-provoking questions, coming up with creative ways of thinking about the material, and explaining the material to others are some examples of positive class engagement that will increase your grade. Performing activities that detract from the welcoming environment (see above in the Exams section) or distract your neighbors or me will result in

a lowered grade. If you expect to miss more than 10% of these classes due to university sponsored activities or other reasons then I advise you to drop the course. Any student who wants to obtain an “excused absence” must meet certain responsibilities, including providing official documentation and making up the work in advance, including homework as well as responses to *pollev* questions and other in-class activities. If there is some reason you must miss a class, then keep me informed on the ASULearn private forum, obtain homework and class activities from the web pages to turn in early or on time, if possible, and provide any official documentation. If the university cancels classes or changes them, 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. Work may still be due on ASULearn or in Zoom. The Monday labs are typically those you can do on your own or in lab, working together with neighbors, and they are counted as part of the Effective ASULearn Engagement grade, where they are turned in, rather than class engagement.

* Accommodations in the determination of your final grade will be made for extenuating circumstances that are officially documented to prevent you from completing work early/on time. If the university cancels classes or changes them, we may adapt the above. The grading scale is: $A \geq 93$; $90 \leq A- < 93$; $87 \leq B+ < 90$... and there is no rounding when converting the numeric weighted average to a letter grade.

1.3 Academic Affairs and University Policies

We adhere to the University-wide syllabus and policy statements:

<https://academicaffairs.appstate.edu/resources/syllabi-policy-and-statement-information>
and University policies like on https://policy.appstate.edu/Policy_Manual

1.4 Course Communication and Additional Policies

- Office Hours and ASULearn Forum: My office hours are on Zoom Sunday, Monday, and Wednesday 7–7:50pm via the link in the need help forum on ASULearn:

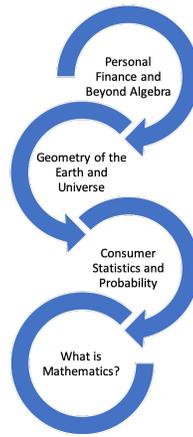
<https://asulearn.appstate.edu/course/view.php?id=146834>

I encourage you to talk to me often in class, office hours, and on the ASULearn forum. Any changes, extra additions or cancellations are announced in class and/or online. You do not need to make an appointment to use office hours—just drop by! I am happy to answer your questions, go over material you are not feeling comfortable with, or help you work on homework. If someone else is in my office hours, join us—we’ll take turns for questions. I strongly prefer that you use office hours, but if you can’t make them, message me on the ASULearn private forum, which I’ll try to answer at least once a day.

- Check course web pages often for work.
- Communicating about work for missed classes: If there is some reason you must miss a class, then keep me informed on the ASULearn private forum, provide me any official documentation, and obtain homework and class activities from the web pages to turn in early or on time, if possible.
- Inclement weather or class changes: If the university cancels classes or changes them, 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. Work may still be due onto the private ASULearn forum.

1.5 Course Goals, Curricular Components, and Learning Outcomes

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 Algebra* 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 video presentation and will conduct peer review.
- *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:
 - Algebra: 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. Students will explore the beauty and utility of mathematics, with emphasis on the development of quantitative literacy and number sense rather than computational drill. All sections cover basic consumer finance and dealing with data, with additional topics selected from fields such as art, number theory, music, science, probability, statistics, geometry, cryptology, measurement, and election theory. Technology, including spreadsheets, will be used to solve a variety of problems.

Curricular Components	WRC 1010 Learning Outcomes
Develop mathematical problem-solving and analysis skills to work towards becoming logical, flexible, critical thinkers who can propose creative solutions to real world problems	<u>all sections of the course will access:</u> Explore applications of algebra, geometry, probability and statistics in everyday life through a combination of problem solving and analysis, including open-ended problems and multiple perspectives. A variety of assessment methods will be used, including labs, exams, and the final project.
Communicate quantitative ideas and concepts using a variety of representations, including numerical, graphical, and algebraic	<u>all sections of the course will access:</u> Communicate quantitative information, including algebraic, geometric, and numeric representations in written documents and presentations, including labs, exams, and the final project.
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	Develop skill in recognizing patterns and similarities in algebraic, geometric, and numerical representations and using those representations to solve real-world problems. Employ technology including Excel spreadsheets, scientific calculators, graphing software, and simulations. Utilize technology to adapt and use mathematical formulas that include cell referencing to answer real-world questions and interpret results.
Recognize and draw upon connections between the mathematical sciences and other disciplines, and between the mathematical sciences and life experiences	Explore interdisciplinary perspectives. Explore applications of mathematics and statistics in everyday life.
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.	Collect and investigate real-world data. Interpret and recognize misrepresentations of studies and statistical data in the real world by applying statistical techniques and critically analyzing the role of chance and probability.
Demonstrate the ability to think critically and creatively about the relationship between local regions and global issues, processes, trends, and systems	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.
Demonstrate the ability to think critically and creatively about the relationship between local regions and global issues, processes, trends, and systems	Identify quantitative connections within local and global geographical regions. Study similarities, differences, or connections during class homework, discussions, or activities.

1.6 Tentative Calendar Fall 2022

Details for the activities in the tentative calendar below will fill in on ASULearn and <https://www.appstate.edu/~greenwaldsj/1010/f22.html>

	Mon	Between Classes	Tues	Between Classes	Thur	Between Classes
8/22–8/25	intro	calculator and polling What is Mathematics? read THoM ratios percent practice	lump sum	lump practice submit handwritten PDF add ASULearn profile pic add Zoom profile pic	lump sum t-shirt day	read THoM lump real-life rates read Franklin's legacy read syllabus
8/29–9/1	Franklin's financial legacy	review and finish Franklin's financial legacy lab read THoM periodic periodic interactive video	periodic payments	lump and periodic practice Jane and Joan practice	lottery decisions t-shirt day	read THoM loans
9/6–9/8	State Holiday		loan payments	study guide finance reflection	loans t-shirt day	loan practice
9/12–9/15	home decisions	review and finish home decisions lab glossary/wiki	loans	review practice	review t-shirt day	debrief review problems
9/19–9/22	car decisions	prepare for exam complete open items	exam 1	What is Mathematics 2	geometry intro t-shirt day	read THoM geom intro geom intro practice
9/26–9/29	geom intro lab	review and finish geom intro lab	artwork perspectives	earth and universe research	measuring, representing, and applying 2D univ t-shirt day	read THoM 2D universes Klein bottle tic-tac-toe
10/3–10/6	2D universe lab	review and finish 2D universe lab	living in a 2D universe	2D universes practice	seeing is believing/shape of the world t-shirt day	debrief seeing is believing/shape of the world read THoM earth
10/10–10/13	earth & expected value lab	bring squishy earth & string review and finish earth & expected value lab begin read THoM universes	earth	earth practice finish read THoM universes	universe t-shirt day	universe practice glossary/wiki
10/20	Fall Break		Fall Break		review t-shirt day	review practice geom
10/24–10/27	universe lab	study guide debrief	review	prepare for exam complete open items	exam 2 t-shirt day	birthday survey bring measuring tape
10/31–11/3	data collection	finish data collection lab surveys	probability	read THoM probability	probability t-shirt day	probability practice

11/7–11/10	probability lab	review and finish probability lab	data analysis	read THoM collecting, interpreting, and summarizing data analysis practice	inferences t-shirt day	read THoM inferences inferences practice
11/14–11/17	inferences lab	amazing stats or internet askew review and finish inferences lab	case studies	read THoM policy decisions	case studies t-shirt day	case studies practice
11/21–11/22	case studies lab	review and finish case studies lab	case studies & review	review practice	University Break	
11/28–12/1	statistics review	study guide debrief glossary/wiki	review/final project	prepare for exam complete open items	exam 3 t-shirt day	read through the final project
12/4–12/6	final project lab	review and finish final project lab course survey course evaluations	present final project ideas	final project video		
assigned time at finals 12/13 2–4:30	turn in video presentation on ASULearn by the beginning of our assigned time (2pm on 12/13) during the assigned time, conduct video project peer review and self-evaluation (optional) exam corrections					

1.7 Where to Get Help and Additional Policies

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. The purpose of 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. Making mistakes is integral to the learning process—the key is to try to continue to engage rather than give up—and this course is to be an environment in which you ask questions and offer good guesses. 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. 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.

I believe that each of you has the capability to succeed in this course. 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 approximately 2–3 hours between each class on average. You can expect to spend this time outside of class per week on assignments and reviewing material.

Many activities are designed to be completed during class and you are responsible for all material covered and all announcements and assignments made at each class, whether you are present or not. You are also responsible for announcements made on the web pages, so check them often.

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/>
- 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>

Academic integrity is a fundamental part of the course, which includes meeting deadlines, attending classes, 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, 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, beverages, 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

- Be sure to take advantage of Dr. Sarah's help inside and outside of class as they are always there to help. Also, be aware that you have homework assignments on ASULearn almost every single day so be sure to do those religiously before each class, as they compromise a sizable chunk of your overall grade.
- Make sure you do all of your assignments on time. Always come to class unless there is an emergency.
- Come to class! This is not a class to skip.

- Stay on top of the readings and always be on time and prepared for lab days! Don't forget to upload them.
- Read the assigned textbook pages! Things can get confusing really fast if you are just trying to follow along in class, so take the time outside of class to make sure you understand the information.
- I would suggest writing down the homework practices online in a note book because the questions are usually very similar to the exams. And if you understand the homework's then you will most likely do very well in the class.
- Don't be afraid to get stuff wrong on the quizzes, they help you understand more if you do and you can look over the hints. and you can always retake it.
- No matter how small it may seem, each of these assignments are extremely helpful and will prepare you for the test! Take it from someone who doesn't study!
- Write down all the think, pair, share answers and work for the questions! These helped me the most on reviewing for exams.
- Dr. Sarah is an incredible professor. As long as you pay attention and takes notes, you'll be fine. Make sure to complete the online reviews on time!
- 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.
- GO TO CLASS!!!! Ask Dr. Sarah for help. They are here to help YOU understand the material and do the best you possibly can. Take notes. Seriously, TAKE NOTES. Definitely pay attention in class because Dr. Sarah will use a lot of the things you see in class as test questions (especially polling questions).
- 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.
- 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 Thursday.
- Make sure you know how each topic relates to local and global concepts and the big idea.
- Don't miss classes because what is said in class is very helpful on the tests. Also, look at the glossary when studying for tests.
- Make sure you check her page every day to stay on task and keep up with the homework on ASULearn.
- 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 during class 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.
- I would recommend writing everything down. Anything Dr. Sarah 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.
- Use your resources!! Dr. Sarah is extremely helpful, knowledgable, and understanding. You also have many opportunities to work with your classmates and pick each other's brains, which helps you to solidify difficult concepts and explore new ideas.
- If I could give any advice, it would be to stay focused and to keep an open mind. There are a lot of complex ideas discussed in this class that you may need to let sink in before you fully understand them, so do your best to stay on track and do the work.
- Critical thinking is important in each lesson so be able to apply the knowledge. Dr. Sarah will answer any questions you may have.
- Ask questions! Dr Sarah can help the most when they know what you need help with! They always give you the opportunity to ask questions so ask away, there's almost always someone else who is unsure about the same thing. You do the work, you get the grades!!
- Work at a consistent pace that is best for you and don't give up. The way that Dr. Sarah incorporated real-life situations into learning mathematics made the experience that much more enjoyable!

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. 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, kayak 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.