Math 185: Number Sense and Algebra Syllabus

Instructors: Dr. Katie Morrison (she/her/hers)   **Office:** Ross 2240C

E-mail (preferred)**:** katie.morrison@unco.edu   **Phone:** 970.351.2995

CONTENTS

Welcome Mathematicians!

I am looking forward to getting to know you and working together to explore topics of Math 185 course. I am excited that you are in this course to learn more about the **mathematical structures behind fundamental ideas through problem solving**. We will work together on mathematical tasks to develop and enhance your algebraic reasoning skills. You will have opportunities to work with concrete (e.g., manipulatives) and abstract models to discover mathematical patterns, relationships and properties within mathematical structures and operations. The course is designed for elementary education majors in the mathematics, science, and new literacies tracks as well as the middle school and secondary mathematics programs (to complete their LAX1-Mathematics requirement). Elementary and middle school teachers play a very important to role to create a healthy, openminded, and future-forward looking society, and I look forward to supporting towards that goal.

We have all had some great and not so great experiences engaging with mathematics in other settings. I will do my best to make this course a safe and brave place for us to learn more mathematics so that this will be one of the great experiences! Let's help each other to achieve this goal.

We each have different perspectives and thinking styles that will strengthen our mathematical understanding. Let's share these strengths. Mistakes and examining mistakes are important part of learning mathematics. Let's turn the mistake-making into an opportunity to learn more in this course.

Student/Visiting Hours:

I have reserved the following times for you to visit me in my office. You can stop by to chat, ask questions, share concerns, or *work in my office*. You don't need to let me know in advance, just come by. If these times don't work with your schedule, I'm happy to work with you to find another time to meet. If for some reason I can't be in my office during any of these times, I will inform you in advance.

> **My Student Hours are:** **Tues:** 3:30pm-4:30pm **Wed:** 12:00pm-1:15pm
> **Thurs:** 11:00am-12:00pm and 2:00pm-3:30pm

How to reach Katie

Office: Ross 2240C **Email:** katie.morrison@unco.edu
Office Phone: (970) 351-2995 (Katie)

There is immense power when a group of people with similar interests gets together to work toward the same goals."
Idowu Koyenikan

JEDI: Justice, Equity, Diversity and Inclusion

"We need to help students and parents cherish and preserve the ethnic and cultural diversity that nourishes and strengthens this community - and this nation"

Cesar Chavez

In this class, we view diversity as a strength. The students in this class come from a variety of backgrounds and perspectives. Students of every identity are encouraged to share their perspective, especially when it differs from others. I recognize that your social identities are not separate from your mathematical identity and will thus strive to recognize the impacts of society on mathematics and mathematics education. Harassment or discrimination against any marginalized group will not be permitted. If such an incident occurs, I will address it and endeavor to prevent similar events.

Also, visit UNC's Equity and Inclusion website to view Cultural and Resources Center.

You Belong Here!

No matter who you are, where you come from, you are welcome in this class.

Support

To achieve your goals in this course, here are some ideas that you can try:

- Take risks and share your thinking with our learning community both in and out of class.
- Form a study group and invite me.
- When you are confused or want to check your understanding, talk to a classmate and to me. We are here to support each other.
- Read the textbook using the focus questions. I will alert you to the relevant chapters. The focus questions will help you focus on important and relevant ideas for each of the chapters.
- Participate in class, share your ideas, mistakes, and thinking processes.
- Start your weekly assignments early.

Most importantly, talk to me when you are excited, confused, or overwhelmed! I am here to listen, support, be a guide, and celebrate your moments with you.

Pronouns/Methods of Address

If you have a name that is different from what might be on the roster, please let us know. Additionally, let us know the correct pronunciation for your name and your pronouns. I will do my best to use correct pronunciation and pronouns, please correct me if I use a wrong pronunciation and/or pronouns.

You may address me as:
Katie, Dr. Morrison, or Professor Morrison (she/her/hers)

Late Work / Attendance Policy:

Our late work and attendance policy this semester only requires that you **communicate with me**.

If you need to **miss class** or have an issue with a **deadline**, please **talk to me** before/after class, in student hours, or by email. I am happy to work with you on this!

If you are ill, or something else is going on in your life that is causing you to miss a substantial amount of class, please let me know. We can work together to create a plan so that you can continue to be successful in this course.

When in doubt, just talk to me.

Important Dates

- **Last day to ADD classes:** Friday, August 29, 2025
- **Last day to DROP classes:** Monday, Sept. 8, 2025
- **Labor Day Holiday (University closed):** Monday, Sept 1, 2025
- **Thanksgiving Holiday (no classes):** Wednesday – Sunday, Nov 26 – 30, 2025
- **Course(s) withdrawal deadline**: Friday, Dec 5, 2025
- **Final Exam**: **8:00am – 10:30am on Monday, Dec 8,** in our usual classroom Ross 2090
  Note: If the university closes during our final exam period, the final exam will be moved to an online assessment, delivered through Canvas, due by Friday December 12, 2025, 3pm. Any student who is unable to access Canvas should contact us as soon as possible to make alternate arrangements.

Course Overview

In Number Sense and Algebra, we will first focus on real numbers (e.g., counting numbers, whole numbers, integers, rational and irrational numbers), their relationship to each other, and how four arithmetic operations (addition, subtraction, multiplication, and division) work with these numbers to form their structure. We will use concrete and/or online manipulatives and abstract models to represent how these operations work. For example, have you ever tried to do fraction division with pattern blocks (see the picture on the right)? Have you ever wondered the mathematical reasoning behind the "copy-dot-flip" procedure for fraction division?

Pattern Blocks

We will make connections between these various forms of representation to enhance our abstraction/generalization of operations and their properties. My goal for you is to develop necessary skills that will help you to explain these mathematical ideas in multiple ways, one of which will be the use of manipulatives. You will have opportunities to communicate your mathematical reasoning through verbal and written explanations. We will examine hypothetical student reasonings to provide constructive mathematical feedback. These ideas are in Chapters 1-6 of our textbook.

We will enhance our knowledge of algebra to set up equations and create drawings (often called tape diagrams) to solve problems (Chapter 9). Deepening our understanding of ratio and proportions will be part of the algebra topics (Chapter 7). We will explore patterns and represent them algebraically. We will talk about sequences (a fancy name for special types of patterns) (Chapter 9). Have you heard of Fibonacci Sequence before (see the second picture on the right)? The last topic from Chapter 9 that we will explore is linear and non-linear functions and the meaning of rates of change (an idea that you might have seen when you learned about slope of a line).
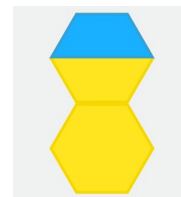
Artist:
Eamon Espey
(Undergraduate Student)

For Description:
https://art-csep.cnsi.ucsb.edu/gallery/binary-fibonacci

Catalog Description

Emphasizes development of algebraic reasoning in conjunction with arithmetic operations. Explorations focus on mathematical structures and operations via implementation of various concrete and abstract models, pattern analysis, relationships, and properties. This course is designed for prospective elementary teachers in the mathematics concentration.

Course Topics and Tentative Calendar

All mathematics content is presented in a problem solving and exploratory context, using appropriate instructional tools. Major content topics include number sets and their properties; investigation of place value in different bases; meaning and interpretations of addition, subtraction, multiplication, division operations, and standard algorithms of operations; investigation of operations and their properties on various subsets of real numbers using concrete and abstract models; investigation of factors and multiples, prime numbers and prime factorization; setting up algebraic expressions, equations, and solving equations; exploring ratio and proportional relationships; and conceptual understanding of functions. Exploration of these topics follows the outline:

- Weeks 1-2: [SLO 1-2 (p.11)] Counting, Natural Numbers and Place Value, (Chapter 1 of the textbook) and Meaning and Interpretations of 4 Arithmetic Operations-addition, subtraction, multiplication, and division. (Chapter 3 Sections 1-3; Chapter 4; Chapter 6 Sections 1-3.) (Progress Check 1)
- Weeks 3 [SLO 1-2 (p.11)] Factors, Multiples, Prime Factorization, GCF and LCM, and Problems with 4 Arithmetic Operations. (Chapter 8)
- Weeks 4-6: [SLO 1-2 (p.11)] Meaning and representation of Fractions and Decimals and 4 Arithmetic Operations. (Chapter 2; Chapter 3 Sections 4 & 5; Chapter 5; Chapter 6 Sections 4-6) (Progress Checks 2 & 3)
- Weeks 7-10: [SLO 3-4 (p.11)] Expressions, Equations and Solving Equations. (Chapter 9 Sections 1-4); Ratios and proportions and inversely proportional relationships (Chapter 7) (Progress Checks 4 & 5)
- Weeks 11-15: [SLO 5-6 (p.11-12)] Sequences, definition of functions and different types of functions. (Chapter 9 Sections 5-7) (Progress Check 6)
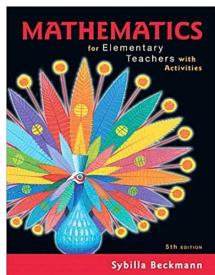
Materials: What will I need?

- You need to get an access to *Mathematics for Elementary Teachers with Activities* by Sybilla Beckmann, Pearson Addison Wesley, 5th Edition, ISBN 978-0134423319 (loose leaf) or ISBN 978-1269405126 (paperback). Note you will use this same book for Math 283, so it may be cheaper to get a used copy than to rent it. Also, this book has many activities that are suitable for your future students.
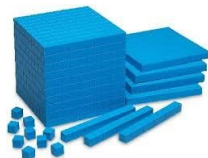- You will also need a **3-ring binder** to store the course handouts from this course. You may also want **colored pencils** and a basic **calculator**, in addition to the standard pencils, eraser, pens, and paper. You can get a graphing or scientific calculator, which might be useful in your future math courses, but not required.
  - We will use a variety of *manipulatives* in class. You do not have to purchase any. You can use virtual manipulatives to practice the ideas from class and help with your assignments. Here are links to virtual manipulatives you can use at home:
  Base-10 blocks: https://www.mathlearningcenter.org/resources/apps/number-pieces
  Fraction bars and circles: https://www.mathlearningcenter.org/resources/apps/fractions
  Pattern blocks: https://www.mathlearningcenter.org/resources/apps/pattern-shapes

Technology: If you have technical issues submitting something to Canvas, TAKE SOME DEEP BREATHS. Then, troubleshoot. Check to make sure the file type is one that will be accepted. If not, save as an accepted file type and try again. If issues still exist, try refreshing your browser, closing Canvas and logging back in, clearing your cookies, restarting your computer. Take a picture or a recording of what you are dealing with on your end and send it to UNC-IT (help@unco.edu), feel free to include me on the email as well. Then, send me an email with the file included.

- As a student, you may install **Microsoft Office 365** on your personal computer for FREE. Additionally, you can purchase Adobe CC Suite at a reduced cost using your Bear email address. Please see this website: https://www.unco.edu/information-management-technology/students.aspx. It provides additional opportunities for you as UNC students.

** Laptops are available for checkout from Michener Library.

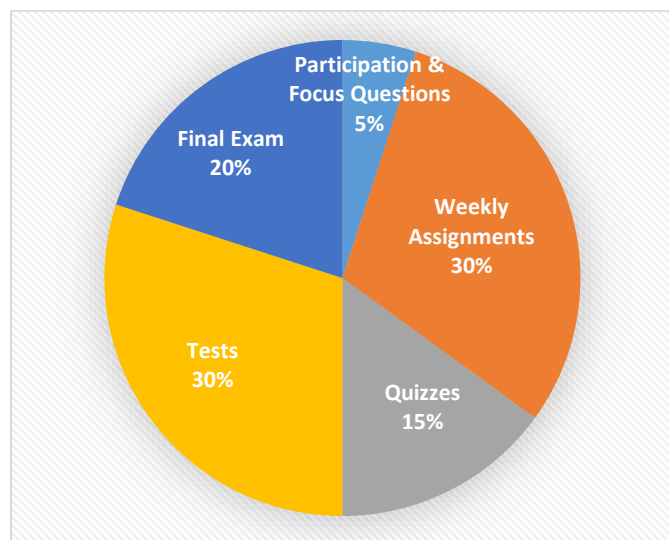**Each student brings their own particular brand of genius.**

Evaluation

You will have different opportunities to show yourself and to us what you have learned, what you are working on, and what you need to study more on. *Learning and understanding takes time and practice.* There are six major assessment methods that I will follow:

- **Participation, presentations of ideas in class, and submission of focus questions (5% of the grade):** Each class session, you will work on questions that are from our course materials and textbook and discuss your ideas with each other. You will be asked to present you and your team members' thinking. Your active participation in these activities is expected; however, I understand that some days you might be quieter. You might need an individual think/work time, which we will provide. I will also ask you to read textbook chapters and/or sections with focus (reading) questions. You will bring your answers to focus questions in class for us to check and share with classmates. I will monitor your participation in all these activities and provide you feedback to enhance your learning through this participation evaluation.

- **Weekly Assignments (30% of the grade).** Every week, you will work on some problems and submit your solutions. Some problems will be from your textbooks, some will be similar to class activities, and some will be different from what we have done in class to expand your thinking. These questions will help you deepen your understanding of the topics. The assignments will be due Thursdays at 11:59pm, on Canvas, as a pdf file. Life happens and you might need an extra time, please let me know.

- **Quizzes (15% of the Grade).** There will be **three in-class quizzes** during the semester. These will occur **around weeks 3, 9, and 13** of the semester and cover topics since the last quiz or test, largely building on the materials from the class activities and HWs. **Note:** The first quiz is tentatively scheduled for Sept 11th.

- **Tests (30% of the Grade).** There will be **two in-class tests** during the semester. These will occur **around weeks 5 and 10** of the semester and will cover the topics since the last test, largely building on the materials from the class activities and HWs. You will also receive a review packet before each test to help you study. These will be handed out in class and posted on Canvas in **Files → Exam Materials**.
Note: Exam 1 is tentatively scheduled for September 25th.

- **Final Exam (20% of the grade):** The final exam will be during the finals' week, on
Monday, Dec 8, 2025 at 8:00am – 10:30am

in our regular classroom: **Ross 2090**. It will cover **all** topics from this semester and will have about 16 questions with parts.
Note: If the university closes during our final exam period, the final exam will be moved to an online assessment, delivered through Canvas, due by Friday December 12, 2025, 3pm. Any student who is unable to access Canvas should contact us as soon as possible to make alternate arrangements.

Pie chart: Participation & Focus Questions 5%, Weekly Assignments 30%, Quizzes 15%, Tests 30%, Final Exam 20%.

Grading Scale:

A: 93-100%	C+: 77-79%
A-: 90-92%	C: 73-76%
B+: 87-89%	C-: 70-72%
B: 83-86%	D: 60-69%
B-: 80-82%	

NOTE: Math 185 is a prerequisite for Math 186, Math 283, and Math 286. You are required to get a grade of C or higher (no C-) in Math 185 to take these courses.

Student Support

Please contact me if something comes up and you're having a hard time keeping up, if you have a question about the material, a concern about the class, a problem with Canvas, or you want to talk about math!

What should I do to be successful in this course?

- Math 185 may be very different from courses that you have been in before. Recognize that this course will take **time** and expect to put the **time** into this course needed to earn the grade you want. Successful students often spend about 3-5 hours outside of class time each week engaging in course related material.
  Time management is an important component of your success. Having a strategy to keep track of daily assignments and longer term projects will be essential to your succes. Everything will be posted on Canvas.
- You will likely run into situations where you are confused by concepts, assignments/projects, or what is expected of you. **Let me know if you are not understanding something**. You can ask us questions during class or send a message in the chat letting us know that something is not clear. We want you to get the support you need to be successful in this course and beyond.
- You can visit Katie during student hours (see student hour info on p. 1) to discuss anything you are confused about, including course concepts, weekly assignments, expectations, questions about grading, or challenges you are having in the course. If you feel more comfortable, bring a classmate or friend.
- If my available student hours do not work for you, please schedule a meeting with me. You can also ask questions through email. I will do my best to respond to emails within 24 hours. At times, my availability is limited due to teaching and other commitments.
- **Math Study Center:** Details will be posted on Canvas as soon as they are available.
- **UNC Tutoring Center:** Tutorial Services (TS) provides **free peer-led tutoring services and academic skills sessions** to UNC students enrolled in undergraduate-level courses. See http://www.unco.edu/asa/tutoring/ for more information.

These resources are not only for students who are failing; many high-achieving students are successful because they use services like tutoring, student hours, and/or study groups.

ASK FOR HELP

Before Class	During Class	After Class
• Read the assigned sections • Complete the homework • Note difficult concepts or questions • Visit me in my office.	• Stay engaged • Participate in class activities • Ask questions • Share your ideas • Circle difficult concepts	• Review class activities & notes • Find/get answers to questions • Practice communicating your ideas • Visit me in my office.

Important Resources

- **Disability Resources:** Disabilities are not a reflection of your intelligence or who you are; they are a reflection of how your brain and/or body work. If you know or think that you have any learning or physical disabilities, the Disability Resource Center (DRC) can help you gain access to resources and let me know how I can best accommodate your needs.

    It is the policy and practice of the University of Northern Colorado to create inclusive learning environments. If there are aspects of the instruction or design of this course that present barriers to students' inclusion or to accurate assessments of students' achievement (e.g. inaccessible web content, use of videos without captions), students should communicate about these aspects with their instructor(s). Additionally, if you have a temporary health condition or a permanent disability that requires accommodations, contact the Disability Resource Center (DRC) as soon as possible. DRC facilitates the interactive process that establishes reasonable accommodations. Office: (970) 351-2289, Michener Library L-80.
    - You can learn more here: **www.unco.edu/disability-resource-center**
- **Food Insecurity and Basic Needs:** Research shows that college students experience food insecurity at higher rates than the American household rate, and that food insecurity can negatively impact academic performance and persistence. In recognition of this problem, UNC offers assistance to students facing food insecurity through an on- campus food pantry. The Bear Pantry is located in University Center 2166A and is open for regular hours throughout the semester. Please visit www.unco.edu/bear-pantry for more information.
- **Student Well-Being:** Students often experience stressors that make it difficult for them to meet the challenges of their courses—stressors like sleep problems, financial concerns, relationship concerns, employment difficulties, feelings of anxiety, hopelessness, or depression.

    - If you are struggling with this class, please visit us during student hours or contact us via e-mail.
    - If you're not sure where to turn, the **website** for UNC's **Student Outreach and Support (SOS)** office lists a wide variety of resources for students. Case Managers in the SOS office can assist students during difficult circumstances which may include medical, mental health, personal or family crisis, and illness or injury.
    - Mental health professionals are available for free, confidential consultations in the **Counseling Center**. To access staff in the Counseling Center, call 970-351-2496 or stop by the Center, located on the second floor of Cassidy Hall. If you are experiencing a crisis after-hours, call the Counseling Center and press #2 to connect with a crisis counselor.
- **Name in Use/Pronoun in Use/Name Change:** Some students may have changed their names to better reflect their gender identity or for other reasons. The process to request that the University change the name that appears on Canvas and on the course roster is available here: https://www.unco.edu/registrar/name-change.aspx
    - **Technology:** As a student, you may install **Microsoft Office 365** on your personal computer for FREE. Additionally, you can purchase Adobe CC Suite at a reduced cost using your Bear email address. Please see this website: https://www.unco.edu/information-management-technology/students.aspx. It provides additional opportunities for you as UNC students.

** Laptops are available for checkout from Michener Library.

- **University Libraries:** The University Libraries has the spaces, resources, and support you need to help you achieve your academic goals. Visit us at Michener Library, on west campus, or at Skinner Music Library, on central campus. Check out all the resources we offer, from scholarly journal databases and streaming media to laptops and anatomical models, at our website: **https://www.unco.edu/library/**. Need research help from an expert? Ask a librarian. We offer multiple ways to get in touch: **https://www.unco.edu/library/research-help/**.
- **Writing Center:** The UNC Writing Center is here to connect you with that feedback. Writing Center Consultants are interested readers who come from a variety of majors and backgrounds, and we are ready to talk about your writing projects. Consultants are trained to work with writing of all types, from all disciplines, and at all levels. We welcome all sessions, whether you're just getting started or are ready to hand in your final draft. You're the content expert; we're the writing experts. Let's work together! Schedule your in-person, video, or email session today by visiting: **http://www.unco.edu/writing-center**

Additional Policies

Honor Code: All members of the University of Northern Colorado community are entrusted with the responsibility to uphold and promote five fundamental values: Honesty, Trust, Respect, Fairness, and Responsibility. These core elements foster an atmosphere, inside and outside of the classroom, which serves as a foundation and guides the UNC community's academic, professional, and personal growth. Endorsement of these core elements by students, faculty, staff, administration, and trustees strengthens the integrity and value of our academic climate.

Academic Integrity: Students are expected to practice academic honesty in every aspect of this course. Students who engage in academic misconduct are subject to grading consequences with regard to this course and/or university disciplinary procedures through the Dean of Students Office. More information about the academic misconduct process can be found in UNC's Student Code of Conduct (BEAR Code). *http://www.unco.edu/dos/Conduct/codeofconduct.html*.

Attendance: Students are expected to attend class regularly. Each instructor determines the relationship between class attendance, the objectives of the class, and students' grades. Instructors are responsible for articulating their attendance policies and their effect on grades to students. Students are responsible for knowing the attendance policy of each course. Only the instructor can approve students' absences. Students are responsible for requesting such approval. In an effort to create inclusive learning environments, this instructor should not require doctors' notes to determine whether or not to excuse an absence.

Title IX: The University of Northern Colorado is committed to providing a safe and inclusive learning environment for all students that is free from discrimination and harassment, including sexual harassment, sexual assault, domestic violence, dating violence, and stalking. Students who have experienced (or who know someone who has experienced) any of these concerns should know that they are not alone. UNC has staff members in the University's **Office of Institutional Equity and Compliance** (OIEC) who are trained to support students in navigating these concerns and are able to provide on- and off-campus resources and supports, referrals to health and counseling services, academic and housing modifications, and mutual no-contact orders between individuals.

Please be aware all UNC instructors and most staff members are required to report their awareness of sexual misconduct to the OIEC. This means that if students tell an instructor about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, the instructor must share that information with the Title IX Coordinator and Equity Officer, Dr. Matt Ricke. Dr. Ricke or a trained staff member in OIEC will contact the reporting students to let them know about resources and support services at UNC as well as their options to pursue an investigation through OIEC, law enforcement, or both. Students who have experienced these types of incidents are not required to speak with OIEC staff regarding the incident. Students' participation in OIEC processes are entirely voluntary.

If students do not want the Title IX Coordinator notified, instead of disclosing this information to the instructor, students can speak confidentially with the following people on campus and in the community. They can connect you with support services and help explore options now, or in the future. UNC has confidential victim advocates available 24/7 by phone – students can contact the **Assault Survivors Advocacy Program** (ASAP) at 970-351-1490 to seek confidential guidance and support.

Confidential Campus Resources

- **Assault Survivors Advocacy Program (ASAP)** Office : 2nd floor of Cassidy Hall
  Office Phone: 970-351-1490
  Web: **unco.edu/asap**
  Hours: M-F, 9am-5pm
  24 Hour Hot Line: 970-351-4040
  Email: **advocacy@unco.edu**

- **UNC Counseling Center**
  Office Located: 2nd floor of Cassidy Hall
  Office Phone: 970-351-2496
  Hours: M-F, 8am-12PM, 1pm-5pm
  Web: **unco.edu/counseling-center**

- **Psychological Services**
  Office Located: McKee Hall Room 247
  Office Phone: 970-351-1645
  Web: **https://www.unco.edu/cebs/psychological-services-clinic/**
  Hours: By Appointment
  Email: **ppsy.clinic@unco.edu**

*Staff members at confidential campus resources are not required to automatically report incidents of sexual or relationship/dating violence or stalking to the University. There are limits to confidentiality, and before speaking with a staff member, those exceptions will be outlined.

If you are a survivor, someone concerned about a survivor, would like to learn more about sexual misconduct, or report an incident, please visit www.unco.edu/sexual-misconduct or contact the Office of Institutional Equity and Compliance (970-351-4899) or email titleix@unco.edu. OIEC is located on the third floor of the University Center in room 3060.

Use of Generative Artificial Intelligence (AI): In all academic work, the ideas and contributions of others must be appropriately acknowledged and work that is presented as original must be, in fact, original. Using an AI-content generator (such as ChatGPT) to complete coursework without proper attribution or authorization is a form of academic dishonesty. If you are unsure about whether something may be plagiarism or academic dishonesty, please contact us to discuss the issue.

Equity Statement

The University of Northern Colorado embraces the diversity of students, faculty, and staff. UNC honors the inherent dignity of each individual, and welcomes their unique perspectives, behaviors, and world views. People of all races, religions, national origins, sexual orientations, ethnicities, genders and gender identities, cognitive, physical, and behavioral abilities, socioeconomic backgrounds, regions, immigrant statuses, military or veteran statuses, sizes and/or shapes are strongly encouraged to share their rich array of perspectives and experiences. Course content and campus discussions will heighten your awareness of others' individual and intersecting identities. For information or resources, contact the Division of Diversity, Equity and Inclusion, at 970-351-1944. If students want to report an incident related to identity-based discrimination/harassment, please visit www.unco.edu/institutional-equity-compliance.   Additionally, there are several cultural and resource centers across the campus that are equipped and designed to serve as caring and thoughtful centers for students, staff and faculty. You can find their information on our course Canvas Support Module.

Land Acknowledgement

The University of Northern Colorado occupies the lands in the territories of the Ute, Cheyenne, Lakota and Arapaho peoples. The University acknowledges the 48 tribes that are historically tied to the state of Colorado. Thus, the land on which UNC is situated is tied to the history and culture of our native and indigenous peoples. UNC appreciates this connection and has great respect for this land. Additionally, the University community pays its respect to Elders past, present, and future, and to those who have stewarded this land throughout the generations. As part of the learning and reflection process please visit https://native-land.ca/ or call the Office of Equity & Inclusion at 970-351-1944.

Here are some readings for additional learning:
(1) Indigenous Mathematicians: https://indigenousmathematicians.org/
(2) News: https://www.cnn.com/2021/08/19/us/colorado-1864-proclamation-rescinded-native-trnd/index.html
(3) From UNC:
    a. Doing History Keeping the Past Project Essay: https://www.unco.edu/hewit/doing-history/pdf/essays/indians.pdf
    b. https://www.unco.edu/hewit/doing-history/colorado-indians/
(4) More history/Colorado history: https://coloradoencyclopedia.org/article/indigenous-treaties-colorado

LAX1/GtPathways Content and Competency Criteria

This course is a part of the Liberal Arts Curriculum at UNC and fulfills 3 credit hours of the Mathematics category*. The Colorado Commission on Higher Education has approved Math 185 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT- MA1 category. For transferring students, successful completion with a minimum C– grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to:

http://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html

UNC's LAC outcomes in Mathematics are aligned with the State of Colorado's GT Pathways student learning outcomes, competencies, and content criteria for GT-MA1. This includes CDHE competency and student learning outcomes in Quantitative Literacy. Competency in quantitative literacy represents a student's ability to use quantifiable information and mathematical analysis to make connections and draw conclusions. Students with strong quantitative literacy skills understand and can create sophisticated arguments supported by quantitative evidence and can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc.).

Student Learning Objective	Problem	Comments
a) Demonstrate good problem-solving habits, including: • estimating solutions and recognizing unreasonable results	Test 2 #12	Students need to use estimation to give a correct answer to the multiplication problem.
• considering a variety of approaches to a given problem, and selecting one that is appropriate	Test 1 #5	Students can approach this problem in a variety of ways, e.g. using a drawing, using some type of manipulatives like pattern blocks or fraction bars, or using division of fractions.
• interpreting solutions correctly	Test 2 #5	Students can use diagrams to help them model the fraction of paint that was used, but then need to switch from thinking of this as a fraction of the paint in the pan to a fraction of a gallon in order to accurately find the amount of paint used.
b) Generate and interpret symbolic, graphical, numerical, and verbal (written or oral) representations of mathematical ideas	Quiz 3 #3	They need to generate a representation of the problem contexts and interpret the given symbolic expressions to determine if they match the context. They then need to solve the problem in the more complicated context, which requires them to generate different symbolic expressions from those provided.
c) Communicate mathematical ideas in written and/or oral form using appropriate mathematical language, notation, and style	Test 1 #9	They have to analyze a student's work and then identify the student's error and carefully explain the correct answer using appropriate mathematical language.
d) Apply mathematical concepts, procedures, and techniques appropriate to the course	Test 2 #5-7	Fraction concepts and operations are key to this course and students need to demonstrate their proficiency with these ideas throughout.

e) Recognize and apply patterns or mathematical structure	Test 1 #8	Students need to apply the structure of the place value system in base 10 to other bases in order to perform operations in those other bases.
f) Utilize and integrate appropriate technology	Quiz 3 #1-2	The primary form of "technology" in this course is the variety of manipulatives that we utilize such as pattern blocks, cuisinaire rods, and base blocks. The students use physical forms of these manipulatives in class and employ virtual manipulatives online for HW assignments.
g) Demonstrate competency in Quantitative Literacy by being able to:		
1) Interpret Information • Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).	Test 1 #1	The students have to switch between multiple representations of different quantities.
2) Represent Information • Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).	Test 1 #11	They have to represent the two decimals on a number line as well as in expanded form in order to effectively explain to a student how the numbers compare.
3) Perform Calculations • Solve problems or equations at the appropriate course level. • Use appropriate mathematical notation. • Solve a variety of different problem types that involve a multi-step solution and address the validity of the results.	Test 1 #6	This type of percent problem relates to many key fraction ideas related to identifying the appropriate whole for that fraction/percent. In this case, they need to identify the original price as 100%, so that the final price is 108%. This entails a multi-step solution process.
4) Apply and Analyze Information • Make use of graphical objects (such as graphs of equations in two or three variables, histograms, scatterplots of bivariate data, geometrical figures, etc.) to supplement a solution to a typical problem at the appropriate level. • Formulate, organize, and articulate solutions to theoretical and application problems at the appropriate course level. • Make judgments based on mathematical analysis	Test 1 #10	They are consistently asked to make use of diagrams to supplement their solution methods. They then are required to explain their solution making use of these diagrams.

	appropriate to the course level.		
	5) Communicate Using Mathematical Forms • Express mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning (may also include oral communication).	Last third of each test	These problems are all questions where the students must explicitly explain their reasoning and argue for a given solution using symbolic as well as written justifications.

Learning Objectives

Licensure: This course provides content necessary to enable middle school licensure standards to address the K-12 Colorado Model Content Standards in Mathematics.

The following grid shows how the course objectives for this course align to the Colorado endorsement standards:

Student Learning Objectives (SLO) for Math 185	Colorado Teacher Quality Standards	English Language Learners Standards	Colorado middle school content standards	Colorado secondary content standards	Assignments/ Evidence/ Outcomes
SLO 1 [Number Systems] Identify structures of base-ten number system (place values) through exploration of different bases with concrete models.			4.23(1)(a) 4.23(2)(b) 4.23(2)(c) 4.23(2)(g)(i)		Class activities and discussions, homework, exams
SLO 2 [Arithmetic Operations] Illustrate different interpretations of four arithmetic operations, and their properties (commutative, associative, distributive) with different number sets, with particular attention to rational numbers.			4.23(1)(a) 4.23(2)(b) 4.23(2)(c) 4.23(2)(g)(i)		Class activities and discussions, homework, exams
SLO 3 [Algebraic Expressions, Equations and Solving Equations] Create algebraic expressions, equations for problems and demonstrate solutions with various concrete and abstract models, and demonstrate use of properties of arithmetic operations in solution process.			4.23(1)(a) 4.23(1)(b) 4.23(2)(b) 4.23(2)(c) 4.23(2)(g)(i)		Class activities and discussions, homework, exams
SLO 4 [Ratio and Proportional Relationships] Identify proportional and inversely proportional situations and solve ratio problems with multiple representations.			4.23(1)(a) 4.23(1)(b) 4.23(2)(b) 4.23(2)(c) 4.23(2)(g)(i)		Class activities and discussions, homework, exams
SLO 5 [Sequences] Identify arithmetic and geometric sequences to represent them algebraically by examining rate of changes (from SLO4).			4.23(1)(a) 4.23(1)(b) 4.23(2)(b) 4.23(2)(c) 4.23(2)(g)(i)		Class activities and discussions, homework, exams

SLO 6 [Linear and Non-linear Functions]. Apply quantitative and covariational reasoning to identify and examine functional relationships between two quantities and identify types of functions (linear versus non-linear). Examine various representations (graphical, tabular, etc,) of functions and construct such representations for functions.			4.23(1)(b) 4.23(2)(b) 4.23(2)(c) 4.23(2)(g)(i)		Class activities and discussions, homework, exams
Process Objectives: Students will develop proficiency and perseverance in problem solving, develop quantitative and abstract reasoning, communicate their reasoning using various modality (oral and written), and use tools such as various representations to both communicate, critique, and evaluate mathematical thinking.			4.23(2)(b) 4.23(2)(c)		In-class groupwork and discussions, homework