MATH 205: Mathematics for K – 8 Teachers: Number & Operations

Western Kentucky University – Summer 2022

Section Number: A01
Instructor: Dan Clark
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Class Times: MTWRF 10:30 – 12:30 CT
Classroom: Zoom, COHH 1101 & Blackboard
Office: Zoom, COHH 3115

Course Description: 3 Credit Hours - Development of conceptual understanding of elementary place value, operations on whole numbers and integers, number theory, basic algebra, and functions.

Learning Objectives: MATH 205 specifically meets the five learning objectives below:

1. Interpret information presented in mathematical/written forms.
2. Demonstrate and communicate problem solving techniques.
3. Illustrate and communicate mathematical information symbolically, visually and/or numerically.
4. Determine when computations/algorithms are needed and execute the appropriate computations and/or algorithms.
5. Utilize appropriate models and algorithms to solve problems.

Prerequisites: Completion of MATH 112 or higher with a grade of C or better; for students in Elementary Education, Middle Grades Mathematics Education, or Special Education Teacher Certification programs only.
Note: Students must pass MATH 205 with a C or better in order to enroll in MATH 206 or 308.

Textbook: You are required to obtain a MATH 205 Course Packet. You will receive more information about where and how to purchase this packet in a blackboard announcement and email.

Course Content & Instruction: MATH 205 may be different than any course you've had before. It is listed as a math course, and you certainly will study mathematics, but not the kind of mathematics you've studied before. In this course you will learn the mathematics needed to become an effective teacher.

What kind of mathematics do teachers need to know? It is mathematics that helps teachers understand how their students are thinking about mathematics and how they can help their students deepen their understanding. It is mathematics that helps teachers see how the different topics in elementary and middle school mathematics fit together and how they can help their students move from easier topics to more challenging topics. It is mathematics that helps teachers re-examine what they have learned before so they can understand the underlying concepts, and so they can effectively support their students' learning.

This is a new kind of mathematical knowledge for you. Learning this mathematics requires that you start fresh. It requires that you become genuinely curious about how and why all those rules in mathematics work like they do, about how children think about mathematics, about the

methods children are likely to use to solve mathematical problems and why some of these methods are useful for them and some are not, and about what kinds of mathematical understandings are essential for children to acquire.

Because you will be learning a new kind of mathematics, you will notice very soon that you are not doing the usual kinds of things. You will not be shown how to do sample problems and then asked to practice more on your own. Instead, you will:

- View videotapes of students doing mathematics and be asked about what they do and do not understand.
- Work problems posed to students in grades K-8 and predict how students might solve them.
- Solve new kinds of problems designed to provide insight into several mathematical topics and promote your mathematical reasoning skills. In doing so, you will understand familiar problems more deeply.
- Examine patterns and structure; formulate generalizations and conjectures; investigate and test your conjectures using concrete materials and other tools; and construct and evaluate mathematical arguments. You will learn to ask yourself: Is there a pattern? What might happen next? Can I make a generalization or conjecture? Do I think my conjecture is true for all cases, true for some cases, true for no cases (that is, false for all cases), and why? Under what circumstances is it not true? Can I give an example? Why does it work? How might I convince my group members that my conjecture is correct?
- Be asked to explain your reasoning – how you were thinking while you were solving a problem, why you think students will solve problems in a particular way, and why you think some methods for solving problems work better than others. ***Developing good explanations that are convincing to others is one of the best ways to verify that you truly understand.***

This course will be one of the more challenging courses you take as you prepare to become a teacher. This is because most of what you will learn will be new. You won't always be able to rely on what you've learned before. But, if you commit yourself to becoming an effective mathematics teacher and apply yourself, what you learn in this course will be invaluable.

Classroom Materials: You should bring pencils (not pens), colored pencils, and a three-ring binder with plenty of loose-leaf paper (not spiral bound) and graph paper (there is some graph paper printed at the back of the course packet; should you need more, you can print it from Blackboard) with you to class every day. The binder will help you keep all of your work organized throughout the semester. In addition, all assignments must be completed in pencil or colored pencil on either lined loose-leaf paper or graph paper as specified. Once completed, assignments will be uploaded to Blackboard as a single PDF file.

Internet Access: You must have regular and reliable access to your WKU email account and Blackboard. Lack of internet access or failure to login to these systems may not be used as an excuse for failing to obtain materials or turn in homework assignments. You should check your WKU email account daily, as all announcements for the class will be sent there.

Calculator: You ***will not*** be allowed to use a calculator in this course. A successful elementary teacher must be proficient with numbers and completely confident when solving problems mentally and on paper without the use of the calculator. Please do not reach for a calculator in

class, even to check your answers. You should be able to verify that your work is correct by evaluating the process that you used to solve a particular problem. In addition, you are encouraged to avoid using calculators on your homework assignments as this will help prepare you for quizzes and exams.

Attendance and Absences: Attendance and participation in class is crucial to your success in this course. If you miss a class for any reason, you will be responsible for obtaining any materials and/or information from your fellow classmates, the instructor, and/or Blackboard.

Because this class is taught in a cooperative inquiry-based format, small group and whole class participation is an essential part of the experience for both you and your classmates. Consequently, absences by individual students hurt not only that student, but also the rest of the class. Furthermore, as a future educator, you must get in to the habit of showing up on time every day ready for work! Excessive absences from class will likely naturally result in a lower overall grade in the course.

Cell Phones and Portable Electronic Devices: Cell phones and other electronic devices can often provide a distraction to the learning environment for students; however, in this learning setup, they can be useful as cameras to share work. It is expected that all cell phones & smart watches be silenced (no vibration) and only used to share work.

Assessment and Grading: Your grade in the course will be based on the following:

Exams: There will be two regular exams (worth 100 points each) and one cumulative final exam (worth 135 points) to measure your understanding of the course material. The exams will be taken outside of the normal class times on the dates listed in the course calendar. More information about the format of the exams will be discussed in class and on Blackboard.

Quizzes: There will be four quizzes (worth a total of 45 points) to check your understanding with a few short-response questions. These quizzes will require about 30 minutes and will be given on the dates listed in the course calendar.

Homework: Homework will be assigned following each lesson in the course packet (worth a total of 20 points). These assignments are designed primarily as learning tools and not assessments. Homework will be checked daily at the very beginning of class for a combination of completeness and correctness. Points will not be deducted for up to three incomplete or unsatisfactory homework assignments. However, beginning with the fourth incomplete or unsatisfactory assignment, you will lose one point per assignment from the 20 available points.

Determination of Final Course Grade: The above assessments provide a total of 400 possible points in the course. Final course grades will be determined using the following scale:

Percentage	**0% – 59%**	**60% – 69%**	**70% – 79%**	**80% – 89%**	**90% – 100%**
Letter Grade	**F**	**D**	**C**	**B**	**A**

Note: All missed exams, quizzes, and assignments will be given a grade of 0. Late homework assignments will not be accepted. The only exceptions to this policy will be those absences that are caused by University approved activities or religious observances for which documentation has been provided to the instructor in advance. The instructor will evaluate unexpected illness or unforeseen catastrophic circumstances on a case-by-case basis and determine whether a make-up is appropriate. Every effort must be made by the student to notify the instructor as soon as possible in these cases.

Understanding Course Grades:

A Pre-service teacher consistently demonstrates competencies that signal that s/he is proficient in the mathematical topics covered in the course. This qualification includes a deeper level of understanding than that expected of the students s/he is preparing to teach. Pre-service teacher demonstrates this level of understanding by consistently going beyond the information explicitly presented by the course instructor to completing new kinds of tasks. This ability to apply one's knowledge to new contexts and to put together various ideas is *essential* for effective classroom teaching because good teachers are able to respond to children's questions, to support and assess children's mathematical proficiency, and to interpret new curricula.

B Pre-service teacher occasionally demonstrates the competencies and the knowledge transfer abilities that characterize the mathematical proficiency of A-level students, but at times is limited to learning well just the information explicitly presented by the course instructor. Pre-service teacher shows evidence of better-than-acceptable level of mathematical proficiency in the topics studied and a deeper level of understanding than that expected of the students s/he is preparing to teach.

C Pre-service teacher consistently demonstrates good levels of performance on tasks measuring straightforward learning of course content, but rarely completes knowledge transfer tasks successfully. Shows evidence of an acceptable level of mathematical proficiency of the topics studied and shows evidence, although inconsistent, of a deeper level of understanding than that expected of the students s/he is preparing to teach.

D Pre-service teacher does not consistently show acceptable levels of performance, even on tasks measuring content explicitly presented by the course instructor. Although the pre-service teacher may have mastered some of the course content, and s/he shows signs of considerable effort, serious questions persist about her/his mathematical proficiency and whether s/he has developed a deeper level of understanding than that expected of the students s/he is preparing to teach.

F Pre-service teacher shows a profile similar to that of the D student but, in addition, appears to be unprepared to teach others at this time. Pre-service teacher consistently exhibits lack of effort, profound and persistent misconceptions, and/or the failure to master some of the course topics.

Academic Dishonesty: Students who commit any act of academic dishonesty will receive from the instructor a failing grade in the course without possibility of withdrawal. The instructor will also present the case to the Office of Student Conduct for disciplinary sanctions.

ADA Statement: In compliance with University policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Student Accessibility Resource Center located in Downing Student Union, 1074. SARC can be reached by phone number at 270-745-5004 [270-745-3030 TTY] or via email at sarc.connect@wku.edu. Please do not request accommodations directly from the professor or instructor without a faculty notification letter (FNL) from The Student Accessibility Resource Center.

Title IX Misconduct/Assault: Western Kentucky University (WKU) is committed to supporting faculty, staff and students by upholding WKU's Title IX Sexual Misconduct/Assault Policy (#0.2070) and Discrimination and Harassment Policy (#0.2040) at

https://wku.edu/eoo/documents/titleix/wkutitleixpolicyandgrievanceprocedure.pdf
https://wku.edu/policies/hr_policies/2040_discrimination_harassment_policy.pdf.

Under these policies, discrimination, harassment and/or sexual misconduct based on sex/gender are prohibited. If you experience an incident of sex/gender-based discrimination, harassment and/or sexual misconduct, you are encouraged to report it to the Title IX Coordinator, Andrea Anderson, 270-745-5398 or Title IX Investigators, Michael Crowe, 270-745-5429 or Joshua Hayes, 270-745-5121.

Please note that while you may report an incident of sex/gender-based discrimination, harassment and/or sexual misconduct to a faculty member, WKU faculty are "Responsible Employees" of theUniversity and **MUST** report what you share to WKU's Title IX Coordinator or Title IX Investigator. If you would like to speak with someone who may be able to afford you confidentiality, you may contact WKU's Counseling and Testing Center at 270-745-3159.

Withdrawal Dates: The last day to drop this course without a grade, without paying a fee, and to change from audit to credit is Thursday, June 2, 2022. The last day to withdraw from this course with a W or change from credit to audit is Tuesday, June 21, 2022.

Math Help Lab: The department of mathematics provides a free tutor for this course. Kaylee Edelen enjoys and is adept at helping MATH 205 students. She is available most days and nights. You may request a Zoom tutoring session with her by emailing kaylee.edelen668@topper.wku.edu . Once you agree on a time to meet, Kaylee will send you a Zoom meeting invite.

Disclaimer: The instructor reserves the right to change, alter, modify, or tweak anything in this document at any time for any reason.

National Council of Teachers of Mathematics Statement on George Floyd, Breonna Taylor, and Ahmaud Arbery

June 1, 2020

As president and past president of the National Council of Teachers of Mathematics (NCTM), we are committed to a position of social justice that challenges the roles of power, privilege, and oppression. We extend our heartfelt sympathies to the loved ones of George Floyd, Breonna Taylor, and Ahmaud Arbery. As a mathematics education community, we must not tolerate acts of racism, hate, bias, or violence.

Many of you, your students, and colleagues watched the events in Minneapolis, Louisville, and Brunswick, Georgia, unfold on television and social media and have been affected by those incidents and the public reaction to them. The trauma of these developments has an impact on the social and emotional well-being of students and teachers in daily life and in classroom learning. Our colleague Matt Larson reminds us that *We Teach More Than Mathematics*. As mathematics educators, we must engage in anti-racist and trauma-informed education in our daily practices as processes of learning and adjustments.

Anti-racist and trauma-informed education not only raises our awareness of racism and trauma experienced by Black, Latinx, Indigenous, Asian, and all marginalized peoples, but it also recognizes that we must be purposeful in addressing racism and trauma. In August 2017 Larson and Berry made several calls to the mathematics education community in their response to the unrest in Charlottesville, Virginia. In this message we renew these calls. As educators, teachers of mathematics, and a Council, we reiterate our position:

- We support the use of mathematics as an analytic tool to challenge power, privilege, and oppression.
- We encourage all educators to challenge systems of oppression that privilege some while disadvantaging others.
- We encourage all educators to create socially and emotionally safe spaces for themselves, their students, and colleagues.

As NCTM's Catalyzing Change series advocates, we need to engage in critical conversations that urge educators to create structures where each and every student can be fully engaged in our democratic society. We owe this not only to our students but also to the society we wish to inhabit both now and in the future.

> One either allows racial inequities to persevere, as a racist, or confronts racial inequities, as an antiracist. There is no in-between safe space of "not racist." The claim of "not racist" neutrality is a mask for racism. (Ibram X. Kendi, author of *How to Be an Antiracist,* p. 9)

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Association of Mathematics Teacher Educators Statement on Systemic Racism

Le tengo rabia al silencio	*I feel rage towards silence*
por lo mucho que perdí;	*because of all that I lost;*
que no se quede callado	*Do not keep quiet*
quien quiera vivir feliz.	*Whomever wants to live happily.*
(Atahualpa Yupanqui)	*(translation)*

Houghton, MI, June 3, 2020 – The Association of Mathematics Teacher Educators (AMTE) stands in solidarity with Black Americans in the face of racial injustice. We are dismayed by the inhuman and unjust treatment of Black Americans by law enforcement personnel in recent months with the deaths of George Floyd, Breonna Taylor, and Ahmaud Arbery. We acknowledge the inequities that the pandemic has illuminated related to health care, economic standing, and education. As an organization, AMTE believes that racism must be interrogated in this country. We cannot look at what is happening to Black Americans and other oppressed groups as problems that they alone need to solve.

As mathematics teacher educators, each of us must become cognizant of the lived experience of Black Americans by reading the history of the United States through a social justice lens. Next, we must learn ways to empower and provide access to students who often are judged by the color of their skin and not by their knowledge and abilities. We must ensure that we foster well-prepared teachers of mathematics who:

- recognize the difference between access to and advancement in mathematics learning and work to provide both access and advancement for every student,
- recognize their responsibility to cultivate positive mathematical identities with their students,
- identify and implement practices that draw on students' mathematical, cultural, and linguistic resources/strengths, and challenge policies and practices grounded in deficit-based thinking,
- understand the roles of power, privilege, and oppression in the history of mathematics education and are equipped to question existing educational systems that produce inequitable learning experiences and outcomes for students, and
- are knowledgeable about, and accountable for, enacting ethical practices that enable them to advocate for themselves and to challenge the status quo on behalf of their students (AMTE, 2017, p. 21 – 24).

Through these actions, we as an organization strengthen our own ability to serve as advocates for those whose voices have been muted and prepare a generation of teachers who are willing to address the systemic problem of inequity in our schools, nation, and world.

In our lives as citizens, we must look to organizations whose mission is to respond to continued racial injustice and to eradicate white supremacy and build local power to intervene in violence inflicted on Black communities by the state and vigilantes. We must stand with organizations like Black Lives Matter that seek to elevate awareness of the lived experiences of Americans of color and dismantle systems of continued racial oppression.

We must act. We (Mike and Megan) issue this call to action to white mathematics teacher educators, including ourselves. It is long past time that we assume the burdens that have been largely left to mathematics educators of color. All of us must affirm and support the lived experiences of our students and colleagues of color who are and have been suffering. We must actively work to be anti-racist in our acts of teaching, research, and service. Today we call on you to not simply express allyship, but to engage with a new resource to strengthen your own ability to see and act in ways that are anti-racist and to critically examine your own practices and the potential biases implicit within them.

To our colleagues of color, to our students, and to all who are suffering in this moment: we see you, we love you, and we support you. Together as mathematics teacher educators, we will bend the arc towards justice.

Yours in Service,
Mike Steele, AMTE President
Megan Burton, AMTE President-Elect

While the words in this statement were assembled and edited by President Mike Steele, President-Elect Megan Burton, and Executive Director Shari Stockero, they originate in large part from the lived experiences of educators of color within AMTE leadership who contributed their perspectives and wisdom. This statement includes contributions from AMTE Past Presidents Marilyn Strutchens, Christine Thomas, and Randy Philipp; AVP for Equity Carlos Lopez Leiva; AVP for Advocacy Zandra DeAraujo; VP for Professional Learning Jennifer Suh, and VP for Publications Babette Benken.

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If you would like more information about this topic, please contact Dr. Shari Stockero, AMTE Executive Director at 906.487.1126 or email at stockero@mtu.edu .