Ball State University
College of Science and Humanities
Department of Mathematical Sciences

Course: MATH 202: Mathematics for Elementary Teachers 3, 3 hrs

Modality: **In-Person** **Semester and section:** Fall 2026 (Section 10**)**

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Textbook: MyLab Math with Pearson eText (18 Weeks) for Mathematics for Elementary and Middle School Teachers with Activities, 6th Edition, ISBN-13: 9780136937821, Beckmann, Pearson, 2022.

Ball State First Day. All required course materials can be obtained through the Ball State First Day program. All students are automatically enrolled each semester. Please check your bsu.edu email for information about delivery of physical and digital materials. Students who wish to opt out during the **Fall 2026** semester must do so by **August 30, 2026**. Students who opt out are responsible for obtaining all required course materials on their own through the Ball State Bookstore or another retailer. If you opt out, your digital access will expire shortly after, and you will lose access to publisher-provided course content, online assignments, quizzes, and exams.

Pearson Information. Many issues can arise with Pearson's MyLab software. Below are some ways to try to troubleshoot on your own. It is recommended that you use Google Chrome when using Pearson in your courses. Follow the Recommended Browser Settings to help with most troubleshooting issues that arise including allowing pop-ups, clearing cache and cookies, etc.

https://support.pearson.com/getsupport/s/article/Chrome-Recommended-Settings?p=browser-usecases/browser-settings-delete-cached-files-and-cookies-chrome

If you are unable to resolve the issue on your own, you can contact Pearson's 24/7 Customer Support: https://support.pearson.com/getsupport/s/contactsupport

Geometric tools: A linear ruler, a protractor, and a set of square rulers.

Technology knowledge: If you have technical questions about Canvas, you can contact Ball State's Help Desk at 1-765-285-1517 or at helpdesk@bsu.edu or the Canvas Support Hotline for Students at 1-844-803-6635.

Some assignments must be submitted via Canvas as a single PDF file. There are applications that can convert documents to a PDF file. Alternatively, you can take pictures of your work and embed the picture into a word document, and then convert the word document into a PDF file.

Prerequisites: MATH 201 with a C– or better.

Catalog Description: In-depth exploration of concepts in mathematics for elementary teachers, including **geometry, measurement, and statistics** with a focus on reasoning, sense-making, problem solving, and communicating mathematical ideas. Includes explorations with technology and analysis of connections to the elementary mathematics curriculum. Includes analysis of children's mathematical thinking and connections to the elementary mathematics curriculum.

Course Objectives & Rationale: The purpose of the course is to foster productive notions of doing mathematics, learning mathematics, and understanding mathematics, and to develop prospective teachers' mathematical knowledge for teaching. MATH 202 is designed to build upon the productive learning experiences in MATH 100 and 201, to provide new productive learning experiences, and to continue the exploration of critical mathematical concepts underlying the elementary mathematics curriculum.

Course Content: The course content includes the following topics and specific student learning outcomes. The order in which these topics are presented is subject to change.

Introduction to MATH 202
Solving Problems and Explaining Solutions

Geometry

10.1 Lines and Angles

1. Use a protractor to discover angle relationships (e.g., complementary and supplementary angles, straight angles, linear pairs, vertical angles).
2. Identify the measure of angles and justify by using angle relationships.
3. Use the fact that a straight line forms a 180-degree angle to explain why vertical angles are congruent.
4. Use the Parallel Postulate to discover angle relationships (e.g., corresponding angles, alternate interior angles, same-side interior angles).
5. Know how to show, formally and informally, that the sum of the angles in a triangle is 180 degrees.

10.4 Triangles, Quadrilaterals, Other Polygons, and Circles

1. Identify and generate specific triangles based on their properties (e.g., sides and angles).
2. Know, state, and prove the Triangle Inequality Theorem.
3. Recognize, identify, and describe the relationships between quadrilaterals using definitions and a diagram.
4. Determine the measure of the interior angles of regular polygons.

Measurement

11.1 Concepts of Measurement

1. Discuss how, to measure a quantity, a measurable attribute must first be chosen. Discuss units and know that measurement is comparison with a unit. Critique student reasoning about units and measurement with a unit.
2. Explain the 1-D, 2-D, and 3-D aspects of measurement and how they apply in real-world contexts.
3. Discuss why the metric system uses the following common prefixes: kilo, hector, deka, deci, centi, and milli. Compare and contrast the metric and customary systems of measurement.

11.2 Length, Area, Volume, and Dimension

1. Given an object, describe one-dimensional, two-dimensional, and three-dimensional parts or aspects of the object, and give appropriate U.S. customary and metric units for measuring or describing the size of those parts of aspects of the object.
2. Recognize that in some cases, one object can be larger than another object with respect to one attribute, but smaller with respect to a different attribute, for 1-D, 2-D, or 3-D attributes.

11.4 Converting from One Unit of Measurement to Another

1. Use multiplication or division or both to convert a measurement from one unit to another and explain why that is the correct operation to use.

Area of Shapes

12.1 Areas of Rectangles Revisited

1. Know and be able to describe what area is and the most primitive way to determine the area of a shape (e.g., by counting square units). Use the primitive method to explain why it is valid to multiply the length and width of a rectangle to determine its area.
2. Use the area formula for rectangles to solve problems.

12.2 Moving and Additivity Principles about Area

1. Use the moving and additivity principles to determine areas of rectangles, including irregular figures and figures with missing parts.

12.3 Areas of Triangles

1. Discover the area formula for a triangle in various ways.
2. Use the moving and additivity principles to explain why the area formula for triangles is valid for all triangles.
3. Use the area formula for triangles to determine areas and to solve problems, including irregular figures and figures with missing parts.

12.4 Areas of Parallelograms and Other Polygons

1. Discuss why one can't determine the area of a parallelogram knowing only the side lengths.
2. Use the moving and additivity principles to explain why the area formula for parallelograms is valid.
3. Use the area formula for parallelograms to solve problems, including irregular figures and figures with missing parts.
4. Use the moving and additivity principles to explain why the area formula for trapezoids is valid.
5. Use the area formula for trapezoids to solve problems, including irregular figures and figures with missing parts.

12.6 Areas and Circumference of Circles and the Number Pi

1. Know that π is a constant of proportionality in the relationship between the diameter and circumference of any circle (i.e., derive the formula for circumference of a circle).
2. Explain why the $A = \pi r^2$ formula for the area *A* square units of a circle of radius *r* units is plausible by subdividing a circle and rearranging pieces.
3. Use the formulas for circumference and area of a circle to solve problems.

12.8 Contrasting and Relating the Perimeter and Area of Shapes

1. Explain why we calculate perimeters of polygons the way we do. Discuss misconceptions with perimeter calculations.
2. Given a fixed perimeter, determine the areas of all rectangles of that perimeter. Given a fixed area, determine the perimeters of all rectangles of that area.

12.9 Using the Moving and Additivity Principles to Prove the Pythagorean Theorem

1. State and prove the Pythagorean Theorem.
2. Use the Pythagorean Theorem to solve problems.

Solid Shapes and their Nets, Volumes, and Surface Area

13.1 Polyhedra and Other Solid Shapes

1. Describe prisms, cylinders, pyramids, and cones based on their faces/surfaces, edges, and vertices.
2. Determine the number of vertices, edges and faces of a given type of prism or pyramid, and explain why the numbers are correct.
3. Derive and use Euler's Formula to solve problems.

13.3 Volumes of Solid Shapes

1. Know and be able to describe what volume is and know the most primitive way to determine the volume of a solid shape (e.g., counting cubic units).
2. Discuss and explain why the volume formula for prisms and cylinders is valid.
3. Discuss why the volume formula for pyramids and cones is valid.
4. Use the volume formulas for prisms, cylinders, pyramids, cones, and spheres to solve problems, including those with composite figures.

Statistics

15.1 Formulating Statistical Questions, Gathering Data, and Using Samples

1. Formulate questions that generate data.
2. Recognize that some samples may not be representative of a whole population but that large enough random samples generally are.
3. Use random samples to make predictions about a full population with the aid of proportions.

15.2 Displaying Data and Interpreting Data Displays

1. Make data displays to help convey information about data.
2. For a given data display, formulate and answer questions.
3. Recognize erroneous or misleading data displays.

15.3 The Center of Data: Mean, Median, and Mode

1. Describe how to view the mean through leveling out and how this relates to the standard formula for finding mean.

2. Solve problems about the mean using leveling out and the standard formula.
3. Create data sets with different means and medians.
4. Discuss errors that students commonly make with the mean and the median.
5. Given a data set or scenario, identify the most appropriate measure of center.

15.4 Summarizing, Describing, and Comparing Data Distributions

1. Given a data set, determine the median, the first and third quartiles, and the interquartile range. Use medians and interquartile ranges to discuss and compare data sets.
2. Make box plots and use box plots to discuss and compare data sets.

Assignments

1. **Exams**: Exams are designed to serve as culminating experiences, opportunities for you to demonstrate the results of your extensive efforts to make sense of mathematical concepts and principles and to write mathematical explanations. There are **three exams**, each worth 10% of your grade, and a **comprehensive final exam** worth 20%. All exams will be taken in class. The Final Exam will be administered on **Friday, December 11 from 12:00 – 2:00 pm.**

2. **Quizzes**: Quizzes will be given periodically, either in class or as take-home assignments. These will help you organize your thoughts and solidify and demonstrate your mathematical understanding. You will NOT be allowed to use your notes, class activities, homework, etc. on your quizzes, *but your lowest quiz score will be dropped.*

3. **MyLab Homework**: These assignments are designed to supplement class activities and to help you practice independent learning. You will complete these assignments online and receive immediate feedback. Three attempts are allowed for each question. All MyLabs for a given unit will be due at 11:59 PM ET the day before of the unit exam with the exception of any MyLabs between the third exam and final exam.

4. **e-Textbook Homework**: These assignments are extensions of class activities. They will help you make sense of key mathematical concepts and principles and practice writing mathematical explanations. They also will help you prepare for quizzes and exams. You will complete these assignments on paper and bring them with you to class. At times, your instructor will provide feedback to help you grow as a mathematics learner.

5. **Writing Assignments & Other Assessments**: These assignments are focused on the development of other aspects of your mathematical power – your engagement in mathematical practices and processes, your mathematics disposition, and your exploration of children's mathematical thinking.

6. **Attendance/Participation:** Your participation in class activities and discussions is **extremely important,** not only for your own learning but also for the learning of others. You are expected to attend class and to be a collaborative participant in the work of the class. Daily Attendance/ Participation will be graded as follows:

   - 5 pts: Attends class and participates*
   - 3 pts: Absent from class but submits the completed Class Activities before the next exam
   - 0 pts: Absent from class and does not submit the missed Class Activities

   **One or more points may be deducted for arriving late, leaving early, using cell phone in class, and/or not participating in class activities. The instructor reserves the right to ask you to complete and submit the participation activities before awarding points if you do not participate in class.*

Methods of Evaluating Student Performance

Your performance in this course will be evaluated in a variety of ways as shown below.

Exams (3 exams – 10% each)	30%
Comprehensive Final Exam	20%
Quizzes	10%
MyLab Homework	10%

Writing Assignments & Other Assessments	10%
e-Textbook Homework	10%
Attendance and Participation	10%

The final grades will be earned according to the following grading scale

Grade	Percentage
A	93%
A-	90%
B+	87%
B	83%
B-	80%
C+	77%
C	73%
C-	70%
D+	67%
D	63%
D-	60%
F	00%

COURSE POLICY, EXPECTATIONS, AND ADDITIONAL INFORMATION

1. **Preparedness for Class**. Students are expected to come prepared to class every day. Preparedness involves **studying thoroughly, in advance,** the material to be discussed in class. You should study **MATH 202** material or complete assignments for about **1-2 hrs.** each day (**about 5-10 hours a week**).

2. **Make-up Quizzes and Exams**. Taking quizzes and exams during the scheduled times is an important part of taking responsibility for your own success. Make-up quizzes and exams will be given only in the event of a documented illness or emergency. In those cases, you must notify me ***before*** the quiz or exam. Students who do not meet these requirements may or may not be allowed to makeup quizzes or exams at the instructor's discretion.

3. **Late Assignments**. Keeping up with assignments will help you succeed in this course. This policy is designed to assist you in that process. It If an assignment is handed in late, 10% of the grade for the assignment will be deducted for each day beyond the due date.

   There are only a few cases in which faculty are obligated to excuse students from class and allow them to make up missed work. These cases include leaves for funerals, bereavement, jury duty, and pregnancy. For more information, please visit
   https://www.bsu.edu/about/administrativeoffices/vice-provost/student-services/attendance-policies

   Note: All work from the regular semester after the third exam must be submitted no later than 11:59 PM on the last day of the regular semester (Monday, December 7). No exceptions.

4. **Professionalism.** Students are expected to be respectful of others' opinions, class time, and course policy. You are very welcome and encouraged to ask questions related to the material that is being discussed. However, please do not address any concern that is not related to that day's content lesson. You may ask any question or express concerns via e-mail or Zoom.

   Also, when we are discussing material, you are expected to be engaged in the material being discussed. Professionalism will also be considered if your final average score is on the borderline.

5. **Policy on Appointments.** To make sure that I am available for a particular day during office hours, please e-mail me to confirm my availability.

6. **Cell Phone and other Electronic Devices Policy**. To be engaged with the material, please do not multitask by using your cell phone or any other electronic device while in class.

7. **Calculator**. Students will need a calculator to complete some tasks in class and on exams. Please notice that a cell phone may not be used as a calculator to complete exam tasks.

8. **Assignments Submitted Via Canvas**. Please notice that some assignments may be required to be submitted via Canvas. If you need to submit a late assignment and the window is closed, please attach it to the comments section and email the instructor to let him know why you submitted the assignment late. **Notice that assignments are not accepted via email**.

9. **Verifying Canvas Scores**. Please always double check the scores posted in Canvas. If there are any discrepancies between the scores in Canvas and your records, you have seven days after they are posted in Canvas to resolve the issue.

10. **Communicating Among Us**. The fastest means to reach me is through e-mail. I encourage you to send me an e-mail whenever possible for concerns or questions you may have about the course. I will do my best to reply within 24 hours, but please wait 24 hours before sending me a reminder. A reminder after 24 hours is welcome and encouraged.

11. **E-mail Etiquette**. Please reply to an e-mail I send you if you have questions about the subject of the e-mail. Otherwise, please start a new e-mail thread with **subject (last name)**. Please do not reply to one of my prior e-mails to ask questions or express concerns not related to the original e-mail's subject. Also, do not use Canvas to e-mail me, unless you are replying to a request via Canvas. My e-mail is jncontrerasf@bsu.edu.

12. **Course Withdrawal**. The course withdrawal period ends **Wednesday, October 28, 2026**. Before this date, students can elect to receive a "W" for the course by completing and submitting the proper form. The instructor's permission is not required. For details, see https://www.bsu.edu/about/administrativeoffices/registrar/registration-activities/withdraw-from-classes as well as Degree Requirements and Time Limits in the current Undergraduate Catalog OR Withdrawal Procedures in the current graduate catalog.

13. **Academic Integrity**. Students are expected to maintain academic integrity, which is essential to the educational process. Forms of academic dishonesty include, but are not limited to, copying sentences/paragraphs/pages of text/whole papers off the Internet, copying answers from the keys or another student' answers, etc. In some cases, you are encouraged to consult external sources, but you must write up your own solution. Academic dishonesty may result in the grade of "0" on the assignment and/or the course and/or the student may be reported to the Director of Student Rights and Community Standards. For more information please visit

    Student Academic Ethics Policy

    Code of Student Rights and Responsibilities

14. **AI in the Classroom**. As you work on and submit assignments this semester, know that using generative AI tools to complete your assignments is a violation of Ball State's Academic Ethics Policy unless the AI use is explicitly approved by the faculty member. In general, students may not submit any work generated by an AI program as their own. Doing so is plagiarism. In courses and assignments where AI use is permitted, faculty will have guidelines for that use. Work created outside of those guidelines will be considered an Academic Ethics Policy violation. If a student's grade is affected by an academic ethics violation, faculty are required to report the violation to the Office of the Vice Provost for Academic Affairs who oversees the Student Academic Ethics policy and maintains records of its violations. More information about the reporting process is available here.

15. **Disability Statement:** If you need course adaptations or accommodations because of a disability, please contact me as soon as possible. Ball State's Disability Services Office coordinates services for students with disabilities; documentation of a disability needs to be on file in that office before any accommodations can be provided. Disability Services can be contacted at 765-285-5293 or dsd@bsu.edu.

    Students who take an exam at the Learning Center should take it when the rest of the class is scheduled to take it. Faculty must approve any exceptions. It is students' responsibility to secure instructor's approval for exceptions or rescheduling of an exam time.

If you take an exam or quiz in Canvas and have any type of issue, including issues with your accommodations, it is your responsibility to let me know immediately so we can take an appropriate course of action in a timely manner. Failure to notify me about the issue or to request an accommodation for which you are eligible, will result in not receiving the appropriate resolution to the issue or accommodation.

16. **Diversity Statement**. Ball State University aspires to be a university that attracts and retains a diverse faculty, staff and student body. We are committed to ensuring that all members of the campus community are welcome through our practice of valuing the various experiences and world views of those we serve. We promote a culture of respect and civil discourse as evident in our Beneficence Pledge.

17. **Freedom of Expression**. In this course, we are committed to fostering a learning environment that values intellectual diversity, encourages free expression, and promotes open inquiry. As members of the Ball State community, we treat each person in the Ball State community with civility, courtesy, compassion, and dignity and respect and learn from differences in people, ideas, and opinions. Please review Ball State University's Freedom of Expression Statement, the resources on Ball State's Freedom of Expression webpage, and Ball State's Beneficence Pledge.

18. **Inclusivity Statement.** Students from all diverse backgrounds and perspectives are welcome in this course. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class. You are welcome to suggest ways to improve the effectiveness of the course for you personally or for other students.

19. **FERPA and Privacy**. As a student, your educational records are considered confidential. Under FERPA (Family Educational Rights and Privacy Act), your records are confidential and protected. Under most circumstances, your records will not be released without your written and signed consent. However, some directory information may be released to third parties without your prior consent unless a written request to restrict this is on file. You can learn more about student rights to privacy by reading Ball State's FERPA and Privacy and Protection.

20. **Student Assistance and Tips for Success**. To earn the grade that you want, you may need to work diligently every day and frequently review previous material so you can be prepared for every test including the comprehensive final exam. I'm available to discuss any questions or concern that you have about the class during office hours, appointments, or via e-mail or zoom.

21. **The Learning Center**. The Learning Center offers free tutoring for many courses on campus. For more information, please call 765-285-1006 or visit this website: https://www.bsu.edu/academics/collegesanddepartments/universitycollege/learningcenter

22. **The Basic Needs Hub**. If you are having difficulty affording enough food, do not have a safe and reliable place to sleep, and/or experiencing an emergency or crisis, help is available through the Basic Needs Hub. The Basic Needs Hub has information, resources, and provides individualized support to students. To talk with a supportive staff member about your experience, receive one on one assistance, or learn more about resources, you can submit a Basic Needs Assistance Form.

23. **Mental Health**. If you are experiencing mental health concerns, telehealth services are available – here is a link to the Counseling Center website.

24. **Title IX / Sex Discrimination**. Ball State University is committed to maintaining an educational environment free from sex discrimination, including sexual harassment, sexual misconduct, dating and domestic violence, and stalking. Students who experience or witness conduct that may violate University policy are encouraged to seek support and assistance. The Title IX Office can provide information about reporting options, supportive measures, and available resources. Contact the Title IX Office at 765-285-1545 or titleix@bsu.edu.

    Please Note: As your instructor, I am a mandatory reporter. If you disclose information to me about conduct that may constitute sex discrimination or sexual misconduct, I am required to notify the Title IX Coordinator. The Title IX Office will reach out to discuss available resources, supportive measures, and reporting options. If you wish to speak with someone confidentially, you may contact the Counseling Center or the Center for Survivor Support.

25. **Addressing Concerns.** If you have any concern about the class, please do not hesitate to e-mail me or make an appointment to talk about it. We can also meet via zoom.

26. **Syllabus Interpretation**. If any part or statement in the syllabus is unclear, then students should ask for clarification as early as possible, but certainly by the time of the first exam. This syllabus and schedule are subject to change in the event of extenuating circumstances.

"It is not enough that we do our best; sometimes we must do what is required."

(Winston Churchill)

Please take advantage of my office hours (M: 3:00 – 4:00 pm & F: 3:00 – 5:00 pm and by Appointment)