# MATH 302B SYLLABUS

Welcome to Math 302B, Understanding Elementary Mathematics (B). This course is focused on the mathematical understanding needed to successfully teach K-8 algebra, geometry, measurement, data analysis, and probability. Considering the time available in this course, we cannot possibly address everything that you will need to know as a teacher; there is simply too much content and too many different ways that children think about the content. Instead, what I hope to do in this course is to prepare you to think about mathematics in ways that will help you as a future teacher. To that end, this course emphasizes two important themes.

## Theme 1: Learning Mathematics with Understanding

We will take an approach to mathematics that is based on the Process Standards from the National Council of Teachers of Mathematics (NCTM), the Mathematical Practices in the Common Core State Standards for Mathematics (CCSSM), and what we know from research about how children learn mathematics with understanding. In short, we will approach mathematics with the idea that **everything in mathematics makes sense, and that you (and your future students) are capable of understanding all of K-8 mathematics.**

We will focus on understanding a few big ideas in depth rather than rushing through a bunch of topics. We will learn about these topics by solving genuine problems (problems I have not told you how to do) and by figuring out why different problem solving strategies make mathematical sense. Related to these ideas, there will also be an emphasis on understanding a *variety of problem solving strategies* and the connections between them. The goal of this is threefold:

- to emphasize that there are multiple ways to make sense of mathematical ideas,
- to familiarize you with some common children's strategies, and
- to develop flexibility in understanding and responding to different strategies so you can figure out what to do when a child does something you have not seen before.

## Theme 2: The *What*, *How*, and *Who* (WHW) of Mathematics

We will examine the **social and political dimensions** of mathematics itself and of the teaching and learning of mathematics by asking the following questions throughout the course:

- ***What*** messages do we send about mathematics and its role in our world?
- ***How*** are mathematical **concepts** and real world **contexts** related in math problems?
- ***Who*** is represented in mathematics and how does this relate to students?

## Your Responsibilities & Keys to Success

At the university level you are expected to do a significant amount of work outside of class (see first homework related to this). Therefore, in class we only have time to **introduce** the key concepts of the course. Outside of class you must work to solidify your understanding of these concepts.

### Good Study Habits

The following study habits will greatly strengthen your understanding of the material in the course. These are especially important if you are struggling with the content. I really enjoy meeting with you and doing math with you; please come to office hours or schedule appointments with me to help with the list below.

- **Start homework early** and meet with me for help.
- **Take good notes** on your work in a notebook. You should be able to look back at your notes and understand your thinking, your solution strategy, and why it makes sense.
- **Review after class:** You should review the activities/lessons we did and summarize the big ideas and some problem solving strategies in a way that you understand.
- **Work with classmates:** You are encouraged to study (review notes and complete homework) with your classmates, but be sure that **you** understand the material.
- **Start homework early** and meet with me for help.

### Group Work

You will work extensively in groups in this class. You should treat each other as a team:

- Do not rush ahead without the rest of your group.
- If you think you understand a problem, **DO NOT** tell your group members how to solve it. Instead, ask them what they are thinking, if they can draw a picture, to explain their work so far, etc.
    - This is better for *their* learning.
    - This is better for *your* learning—you may learn a new way of thinking.
    - It is excellent practice for you as a future teacher to learn how to ask questions that help someone think for themselves instead of giving the answer.

### General Expectations

- Do not text, read newspapers, or do other class work in our class.
- Before emailing me questions about the logistics of the class you should double check the syllabus, assignments/handouts, and D2L.

### Homework

- Homework will involve (a) reviewing previous material, (b) extending previous material, and (c) foreshadowing new material.
- Good teaches are constantly learning, so you should expect to have to do some learning and reasoning on your own in the homework—it will not always be an exact match to what we have done in class.
- You are strongly encouraged to meet with your instructor **before** homework assignments are due to make sure you understand the important ideas.

# REFLECTIONS

Part of your job as a teacher is to continually reflect on your own teaching. As a teacher you will be responsible for creating a particular form of mathematics in your classroom. The reflection assignments provide you with an opportunity to reflect on what that mathematics will look like. Specifically, you will reflect on what mathematics is, what it means to do mathematics, the role of the teaching and learning of mathematics in our society, and the social and political nature of mathematics.

Reflection assignments should be typed in MS Word or a compatible program and uploaded to the Dropbox on D2L.

The reflection assignments include:

- Two **introductory** assignments
    - *Reflection 1: What is Mathematics?* allows you to reflect on mathematics at the beginning of the course.
    - *Reflection 2: Practices and Processes* introduces the approach to mathematics we will take in this class. This assignment relates most strongly to the **learning with understanding** theme in the course (see page 1).
- Two **main reflection** assignments
    - These look at the *social and/or political nature of mathematics* in one or more ways. These readings are generally different from the mainstream view of mathematics. This is purposeful because your time at the university provides a unique opportunity to reflect on these perspectives.
    - These readings relate most strongly to the ***What, How*, and *Who* (WHW)** theme of the course (see page 1).
- A **final reflection** assignment in which you reflect back at the end of the semester.

## What You Will Write

A complete reflection involves (1) your initial reflection, (2) my comments back, (3) your response (due at the same time as the next reflection assignment), and (4) my final feedback and your grade.

All of the **main reflection assignments** will include questions that ask you to:

- Reflect on your own beliefs prior to reading the articles
- Share and justify your opinion of the author's argument
- Reflect on your past mathematical experiences in light of the author's argument

**You Do NOT Have to Agree**

You are not required to agree with the authors or with me. Your grades will be based on whether you think deeply about and take seriously the authors' points and my comments, not based on your opinions. I believe that an open and honest discussion of these ideas is the most productive way to learn about them.

## Reflections Rubric

Your papers and response to my comments will be graded as a whole based on the scale below. This rubric is a guide; I may also assign in-between scores (e.g., 90%, 77.5%). **Late assignments** will be docked a letter grade for each class period late.

**Clarity and Neatness**

- Good communication and writing skills are as important in mathematics as in any other subject. Be careful about your spelling, grammar, word choice, etc.
- Think carefully about how to express yourself in a clear manner.
- If you need to include a diagram, handwritten mathematical work, or a picture you can hand in a copy in for me to scan or you can scan it yourself and include it in your paper.

| | |
|---|---|
| A+<br>100% | Goes above and beyond a grade of A by doing one or both of the following:<br>• Shows particular depth of thought and understanding of the author's argument(s)<br>• Makes connections to outside resources |
| A<br>95% | Thorough and thoughtful response to all of the questions posed on the assignment and to all follow up comments/questions from the instructor.<br>Demonstrates a careful reading of the author's argument and accounts for the nuance in the author's point(s), regardless of whether you agree or disagree. |
| B<br>85% | Response addresses all questions and/or comments, but some of the analysis is superficial in nature. |
| C<br>75% | One or more question/comment is missing or severely shortchanged and/or you do not appear to have thought deeply about the nuances of the argument(s). |
| D<br>65% | Minimal work or connection to the questions/comments on the assignment. |
| E<br>0% | No work or I am unable to understand what you did. |

## Format, Sources, Citations, et cetera

### Quality of Sources

The following are generally appropriate sources:

- News articles
- Government reports
- Reports by think tanks and major organizations
- Academic research

The following are generally not appropriate sources:

- Blogs (although some blogs associated with news sources may be okay)
- Wikipedia and similar sites that only reference outside sources (these are good places to start, but you should look up the original source)
- Infographics that combine information from several other sources

### Citations

I prefer APA citations, but whatever format you are most comfortable with is fine. You need to **cite everything** that you got from somewhere else (this includes paraphrasing!). It is much better to have a citation for every single sentence than it is to misappropriate someone else's work.

You must provide citations in **two places:**

- In the final product as they come up.
    - Provide a **short citation** for each thing in your final product as it comes up.
    - If you are citing data/information from a website then include the **exact link** to that piece of information (I should not have to click around to find it).
- At the end in a references section. These citations should be complete and should generally include:
    - Author (may be an organization)
    - Title of the source/article
    - Date (may be just the year or "no date" for some websites)
    - Publication venue (for example name of newspaper)
    - Web address if it is from a website

# SCHEDULE

This schedule is **subject to change**. Topics in brackets may be cut if needed.

| Date | | Topic | Due In Class | |
|---|---|---|---|---|
| R | 1/10 | Algebra: Patterns (§9.5) | | |
| T | 1/15 | Algebra: Patterns | | Refl 1 |
| R | 1/17 | [Algebra: Equations (§ 9.1, 9.2, 9.3)] | HW 01 | |
| T | 1/22 | Algebra: Functions (§ 9.7, 9.8) | | |
| R | 1/24 | Geometry: 2D Shapes (§ 10.5) | HW 02 | |
| T | 1/29 | Geometry: 2D Shapes | | |
| R | 1/31 | Geometry: Angles (§ 10.2, 10.5) | HW 03 | |
| T | 2/5 | Geometry: Angles | | Refl 2 |
| R | 2/7 | [Geometry: 3D Shapes (§ 13.1, 13.2)] | HW 04 | |
| T | 2/12 | Geometry: Transforms & Symmetry (§ 14.1, 14.2) | | |
| R | 2/14 | Geometry: Transforms & Symmetry | HW 05 | |
| T | 2/19 | Geometry: Transforms & Symmetry; Review | | |
| R | 2/21 | **Exam 1: Algebra & Geometry** | HW 06 | |
| T | 2/26 | Measure: Length (§ 11.1, 11.3, 11.4) | | Refl 3 |
| R | 2/28 | Measure: Length | HW 07 | |
| T | 3/5 | Measure: Area (§ 12.1-5, 12.8) | | |
| R | 3/7 | Measure: Area | HW 08 | |
| 3/11-3/15 | | Spring Break | | |
| T | 3/19 | Measure: Area | | |
| R | 3/21 | [Measure: Volume (§ 13.3, 13.4)] | HW 09 | |
| T | 3/26 | Measure: Circles: Circumference (L 10; § 12.6) | | Refl 4 |
| R | 3/28 | Measure: Circles: Area (§ 12.6); Review | HW 10 | |
| T | 4/2 | **Exam 2: Measurement** | | |
| R | 4/4 | Data Analysis: Introduction (L 11; § 15.2) | HW 11 | |
| T | 4/9 | Data Analysis: Introduction | | |
| R | 4/11 | Data Analysis: Mean and Median (§ 15.3) | HW 12 | |
| T | 4/16 | Data Analysis: Distributions (L 12, 13; § 15.4) | | |
| R | 4/18 | [Data Analysis: Design and Errors (§ 15.1, 15.2)] | HW 13 | |
| T | 4/23 | Probability: One Stage Games (L 14; § 16.1) | | |
| R | 4/25 | Probability: Multi-Stage Games (L 15; § 16.3) | HW 14 | |
| T | 4/30 | [Probability: Fractions (§ 16.4)]; Review | | Refl 5 |
| R | 5/2 | Reading Day: Optional Review Session | | |

**FINAL EXAM (cumulative) || Regular classroom**
**Sect. 05: R 5/7 10:30-12:30 p.m.**
**Sect. 06: W 5/8 1:00-3:00 p.m.**